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ABSTRACT

The 1965 meeting of the Western Regional Conference on Testing Problems dealt with change in education. The following speeches were presented: (1) "The Winds of Change in Mathematics Education with a Discussion of Some of the Stronger Gusts" by Sheldon S. Myers; (2) "Articulation Problems in California Foreign Language Instruction" by Kai-yu Hsu; (3) "External Examinations and Continuity" by Jack N. Arbolino; (4) "What's in a Norm--Testing What We Really Teach" by E. L. Keezel; and (5) "New Directions in Assessing Achievement" by Robert J. Solomon. (KM)

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WESTERN REGIONAL CONFERENCE ON TESTING PROBLEMS

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1965

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EDUCATIONAL TESTING SERVICE

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The Fourteenth Annual
Western Regional Conference on
Testing Problems

Documenting Educational Change

May 7, 1965 · Hilton Inn
San Francisco International Airport

Theodore L. Reller, *Chairman*

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Contents

Morning Program

INTRODUCTORY REMARKS 1

Theodore L. Reller, Dean, College of Education, University of California, Berkeley, California

THE WINDS OF CHANGE IN MATHEMATICS EDUCATION WITH A DISCUSSION OF SOME OF THE STRONGER GUSTS 3

Sheldon S. Myers, Chairman, Mathematics Department, Test Development Division, Educational Testing Service, Princeton, New Jersey

ARTICULATION PROBLEMS IN CALIFORNIA FOREIGN LANGUAGE INSTRUCTION 12

Kai-yu Hsu, Chairman, Department of Foreign Languages, San Francisco State College, San Francisco, California

EXTERNAL EXAMINATIONS AND CONTINUITY 25

Jack N. Arbolino, Executive Director, Council on College-Level Examinations, College Entrance Examination Board, New York, New York

Afternoon Program

WHAT'S IN A NORM—TESTING WHAT WE REALLY TEACH 33

E. L. Keezel, Pupil Personnel Director, Beaverton High School, Beaverton, Oregon

NEW DIRECTIONS IN ASSESSING ACHIEVEMENT 44

Robert J. Solomon, Vice President, Educational Testing Service, Princeton, New Jersey

CLOSING REMARKS 52

The Fourteenth Annual Western Regional Conference on Testing Problems

The fourteenth annual meeting of the Western Regional Conference on Testing Problems was convened at 9:15 a.m., May 7, 1965, at the Hilton Inn, San Francisco International Airport, by Mr. Robert E. Lambert, Director of Advisory Services for the Western Office of the Educational Testing Service.

MR. LAMBERT: I'm Bob Lambert, Director of Advisory Services for the Western Office of ETS. It is my distinct pleasure to welcome you to the Fourteenth Conference and to introduce your Chairman, Dr. Theodore L. Reller.

Dr. Reller's background résumé, which was compiled either by a dutiful wife or an adoring secretary, is frightfully impressive. Because he does not need the addition of another stone to the already impressive cairn of his past achievements and honors, I shall give but a few facts from his vita. He received his Baccalaureate and Master's Degree at the University of Pennsylvania. He then moved to Yale where he earned the Ph.D. He has been a teacher and a supervising principal of public schools. He served as an instructor to the Professor at the University of Pennsylvania. As you know, he is presently Dean of the School of Education at the University of California.

Without further delay I entrust the day's convention fortunes to the capable hands of Dr. Reller.

CHAIRMAN RELLER: Thank you Mr. Lambert.

Today we are gathered to look at the question, at one of the more important questions—perhaps the most important—of education in our and other societies, the question of Change. We live in

a period that is characterized by something approaching revolution if it not be revolution. We see this in the increase of population. We see it in the increase of nations, in knowledge, in technology. In educational expectation we have seen a revolution so great that, as a matter of fact, many people are concerned whether or not it will be possible to live somewhat in accord with this revolution in expectations. And if we should not there may be unfortunate consequences.

When I think of this matter I recall a meeting at which a speaker for the Soviet Union traced the very enormous developments in education in the Soviet society over a period of forty years and indicated the extent to which actually the building of the Soviet society had been an educational operation. He painted a very glowing picture of forty or a little more than forty years of development. And when he finished, the Chairman of the meeting, who was the Minister of Education in Nigeria said, "But it took you forty years. Who's interested in anyone who moves as slowly as that? This has no meaning for our society. We must do this in five years." This indicates something of the ferment, the spirit of revolution that runs through our societies.

I think it is important that we recognize that change is not always even. You get change in one level and in one area but at different times. Also I think we need to note that there is considerable resistance to change in any one situation. Both of these things, I think, characterize educational developments in our own society.

With reference to Change, the matter of appraisal or evaluation is extremely important for it is particularly, perhaps peculiarly, related to a society or to an educational system during a period of great change, for appraisal and evaluation can either facilitate or retard. I recall members of faculties in Indian universities who say that they cannot really deal with anything that has occurred in recent years because it is not covered by the examinations and the students simply revolt if you deal with anything that is modern because they know it doesn't relate to the examinations they will be taking.

■ This morning we are going to turn first to a couple of areas in which there has been most substantial ferment and change. We are very fortunate today in having a group of outstanding speakers to give us some picture of the changes that are occurring. Our first speaker will deal with some of the problems related to the area of mathematics.

I think I need take very little time to comment regarding his competence for this assignment. He certainly is as outstanding a person as could have been found for this particular area. Having completed his undergraduate work in the science of engineering at the University of Cincinnati he went on to complete his doctorate in mathematics at Ohio State. His thesis was "The Nature of Definition in High School Geometry." He has been with ETS since 1955 as Head of the Mathematics Department and has been very deeply engaged in the development of appraisal and the approaches to testing during this period of time.

He is noted for his relaxed, yet passionate approach to the field of mathematics. He has been very much interested in the measurement of the insightful and non-routine thinking of young people. To ask the searching question that at once challenges and stimulates is the main objective of his work. He believes all students should be encouraged to explore and to discover mathematical concepts on their own, should have the opportunity to solve novel problems and should acquire notions of how a mathematician thinks. He will be leading us in our thinking this morning dealing with the subject, "The Winds of Change in Mathematics Education with a Discussion of some of the Stronger Gusts." It gives me a great deal of pleasure to present to you Dr. Sheldon Myers. Dr. Myers.

The Winds of Change in Mathematics Education with a Discussion of Some of the Stronger Gusts

SHELDON S. MYERS

This paper will attempt to provide an overview and some historical perspective on the current situation in mathematics education. The major characteristics of contemporary mathematics grades K-12 will be described and some of the curriculum projects will be discussed.

One of the first series of national grants for the improvement of education occurred some time ago. The government was a monarchy. The receiving institution was a university with its library located in a pleasant, sub-tropical climate at the delta of a giant river. One of the professors involved was able to reorganize the loose, informal, intuitive, non-rigorous mathematics of his day into a polished, rig-

orous deductive system. The curricular materials that he wrote and tried out on adult students were published as a handwritten Greek textbook of 13 chapters. The professor was Euclid; the textbook was *The Elements of Geometry;* the source of funds was one of the Ptolomies of Egypt; the institution was the University of Alexandria at the delta of the Nile; and the period was about 300 B.C. to 275 B.C.

Euclid received his pre-service training in the academy of Plato in Athens. Aristotle received his training in Plato's academy and Plato in turn received his training from a private tutor, Socrates. Although Euclid patterned his deductive structure consisting of undefined terms, axioms, postulates, and theorems on the system of logic described by Aristotle in the *Organon,* he was the first to organize a branch of mathematics into an almost completely rigorous and deductive system. Euclid's *Elements* stands as a timeless intellectual monument to one of the greatest mathematicians in history. In style, elegance, and uniqueness, the *Elements* is comparable to the statues of Michelangelo, the paintings of Rembrandt, the fugues of Bach, the quartettes of Beethoven, and the plays of Shakespeare.

The *Elements* was not written as an immediate response to practical human needs. Rather, they were written in a leisurely academic environment as an exercise of the intellect. Most of the geometric facts of the *Elements* were known several thousand years earlier to the Egyptians and Babylonians. The annual flooding of the Nile wiped out boundary lines between farms facing the river. These were re-established each year by surveying methods utilizing the empirical geometry known to that day. A base line, above the high water mark, ran parallel to the river bank. The boundary lines between farms intersected the base line at right angles. Egyptian surveyors called "harpedonaptae," or rope stretchers, would resurvey the boundary lines after the annual flood. For this purpose, they used a rope knotted in three parts in the ratio 3 to 4 to 5. By stretching the rope into a right triangle, at the appropriate points on the base line, the washed out boundary lines could be redrawn perpendicular to the base line and parallel to each other.

The Babylonians not only knew the geometric relationship later called "the Pythagorean Theorem" but they also defined the degree unit for measuring arcs and angles. Their astronomy was highly advanced and they knew that the earth required about 360 days to make a trip around the sun. The portion of arc traversed in one day

was therefore taken as a basic unit equal to 1 degree. The base of 60 of the Babylonian system of numeration ("sexagesimals") was probably also derived from the number 360.

Most of the Greek forbears of Euclid in geometry knew the subject from an intuitive, empirical point of view. From Pythagoras who established a school at the Greek colony of Croton in southern Italy, to Thales who established the Ionian school of geometry after wandering as a merchant through the Near East, to Eudoxus who developed the theory of proportions and incommensurables which Euclid largely used, most of the geometry prior to Euclid was a collection of isolated facts with only an occasional, fragmentary, deductive chain of theorems.

Euclid's great contribution was to organize this body of knowledge into a self-contained, autonomous, deductive system. This system began with primitive assumptions consisting of axioms, postulates and terms and a sequence of theorems, each theorem being deductively proven by means of previously proven theorems and/or assumptions. The first six books of Euclid consist of the theorems now known as plane geometry. Books VII through X consist of number theory and the geometric equivalent of elementary algebra. Books XI through XIII consist of theorems now known as solid geometry. Although Euclid's *Elements* had some logical flaws, such as attempting to define all terms and proving the contrapositive of a theorem already proven, it stands as the first example of a postulational or mathematical system in history. Next to the Bible, the *Elements* is the most widely printed and studied book in the Western world.

In Euclid, mathematics had swung from an intuitive, empirical, and applied science to a rigorous, autonomous, and pure mathematical system. Although an obscure work of Euclid, known as the *Optics*, indicates that Euclid was not unaware of applications, the impact of the *Elements* through the centuries has been on rigor for its own sake, rather than on the applied aspect of mathematics.

The history of mathematics education has been marked by swings between informal, applied mathematics and rigorous, abstract mathematics. After the destruction of the University and Library at Alexandria, the *Elements* became lost to the Western world and was known for a period only to the Arabs in Arabic translations. Our first Latin version of the *Elements* was made available by Adelard of Bath about 1120 A.D. who translated the Arabic version available in Spain. Our first English version was made available by Billings-

ley in 1570 by translating the Latin version of Adelard. From this time on, the rigorous Euclidean approach dominated the British approach to geometry. The French, on the other hand, gradually evolved a more informal, intuitive geometry. By the middle of the eighteenth century the French were making extensive use of rotations, reflections and symmetry in an informal, intuitive, nonrigorous way.

The great French mathematician, Legendre, attempted to reform the loose, informal teaching of geometry in France by publishing in 1794 the first mathematically rigorous text of geometry based on the requirements of modern education. This text departed significantly from Euclid's sequence.

Euclid's *Elements* came to this country via England in the form of translations by Todhunter and others. The text of Legendre came to this country via translations by Charles Davies, professor of mathematics at West Point. The Davies translation of Legendre became the most widely used textbook of geometry in the United States until the geometry textbook of Wentworth around 1900.

Aside from the few universities in this country where geometry was taught via Todhunter or Legendre, most of the colonial mathematics in this country at the academy and early college level was of the applied kind. Colonial arithmetic dealt with reckoning tables of interest and measures. Most arithmetic problems were business problems. Geometry below the college level was mostly mensurational.

I once spent a week at the University of Michigan examining the Karpinski collection of mathematics textbooks published in the United States before 1850. I also examined student notebooks in mathematics from colonial days. In one notebook, I found the methods of calculating the volumes of 14 different types of haystacks. In others I saw beautiful, colored maps drawn in ink representing the solution of surveying problems. The trigonometry of those days was taught chiefly for the purpose of navigating the early Yankee sailing vessels or for surveying new land on the expanding frontier.

The curriculum of the early American academy was packed with a great variety of practical courses. These academies prevailed until gradually replaced by the comprehensive high school in the latter part of the nineteenth century. By the end of the eighteenth century the subjects of geometry and algebra had moved downward from sophomore to freshman subjects in college and, in the early

nineteenth century, because requirements for admission. Thus algebra and geometry became traditionally secondary school subjects.

With the spread of the geometry texts of Todhunter, Legendre, and Wentworth, the teaching of geometry in this country became relatively formal and the predominantly applied aspect of colonial mathematics decreased greatly. Arithmetic was taught by formal rules, such as the rule of three, aliquoting, etc., and cyphering was taught like calisthenics. Cyphering matches rivaled spelling matches as social events in Darke County, Ohio.

The spread of pragmatism in education and the writings of James and Dewey brought on the progressive education movement. The emphasis in the mathematics curriculum shifted from the formal, if not rigorous, approach to an emphasis on the socially significant uses of the subject. General mathematics courses spread widely and much of mathematics below the high school became a kind of non-structured, socialized, business arithmetic. Consumer mathematics prevailed at the expense of any interrelated mathematical structure. Curriculum building via job analysis almost spelled the death knell of mathematics as a unified system with interrelated concepts and themes.

It was in this context, although delayed by World War II, that the present reform movement in mathematics took place. The movement was well underway before the first Sputnik occurred in 1957. The movement marked a swing once again from the empirical, informal, non-rigorous applied mathematics of social and business arithmetic to a systematic treatment of mathematical concepts.

The modern reformers were motivated by several strong considerations:

1. In the nation's classrooms of 1950 there was very little sign of the considerable body of new mathematics developed since 1900 or its uses.
2. Because of its lack of mathematical organization and unity, the older curriculum failed to develop real understanding and the ability to extend and apply knowledge.
3. Often what was being taught was not significant mathematically and was distorted, if not incorrect.

Now what are the major features of the new curricula in mathematics which have evolved since 1950? Probably the most important feature is the approach, rather than the content. Over 90 per cent of the older mathematics has been retained but is developed differently. Some less significant topics have been discarded.

Much is involved in the new approach. In the first place, the pedagogy of mathematics has shifted from telling to asking, that is, from lecture to heuristic techniques, from memorizing to discovery, from rote repetition to probing. The student has been changed from a passive to an active learner. The new approach also implies a new attitude toward mathematics. The student is led to experience a little of the thought processes of a mathematician. Mathematics is approached as an intriguing game of inquiry and discovery to be enjoyed for its own sake. The new approach generates what has been described as a mathematical atmosphere in the classroom.

It is significant that, although the new curricula in mathematics with regards to content stress mathematical correctness, mathematically significant topics, and the unity of mathematics through interrelated concepts, the new curricula with regards to pedagogy or approach did not return to the formal, expository procedures of the past but rather turned to new and stimulating heuristic processes which have been described above.

What have the foregoing points meant for the new elementary school programs? For contrast, let me first describe the traditional elementary program:

1. Names, numerals and meaning of numbers introduced formally, usually by rote counting.
2. Addition and subtraction facts developed by flash cards. Numerous, formal exercises.
3. Simple story problems introduced.
4. Story problems gradually become more complex and apply chiefly to grocery and domestic arithmetic. Later, business problems are introduced.
5. Fractions, decimals and per cent introduced with formal relations between them memorized.
6. Denominate numbers formally taught. Some work in mensuration with formulas memorized.
7. Very little on space perception, geometry, properties of numbers, algebra. Procedures memorized and then practiced.

An up-to-date modern elementary program could be described as follows:

1. The meanings of cardinal and ordinal numbers developed by a variety of manipulative structural materials. Names and numerals emerge in this context.

2. Number facts of the fundamental operations are developed by children experimenting with materials and symbols.
3. Simple story problems are developed by children using physical contexts.
4. Fundamental relations among numbers, such as the commutative and associative principles of addition and multiplication are developed intuitively from physical situations.
5. Properties of the real number system are gradually developed by the children. Concepts of zero, one, closure, multiplicative and additive inverses, commutative, associative and distributive laws are developed gradually by the children.
6. The number line is used quite early to develop the meaning of the operations, understanding of the fundamental properties of the real numbers, and in the invention of new numbers, such as the fractions and negatives.
7. Inequality ideas are developed with the equality.
8. Children explore such properties of numbers as odds and evens, clocks and calendar arithmetic, number arrays, series, etc.
9. Numeration systems to other bases are investigated in order to increase understanding of the decimal system.
10. Number frames and open number sentences are considered. Children grow accustomed here to horizontal impressions and literal symbols for numbers such as: What are all numbers N, such that $N + 3$ is greater than 7?
11. Space perception and informal geometry are developed.
12. Intuitive concepts of measurement are developed and most of the ordinary mensurational formulas are developed by the children.
13. Wide experience in both asking and answering questions is provided.
14. Elementary statistical ideas are developed.
15. Graphs evolve from work with the number line. Interpretation as well as construction of graphs is emphasized.
16. The ideas of fraction, decimal, per cent are developed by children and used in varieties of problems.
17. The use of good logic by teachers in everyday situations for emulation by children. The use of true and false statements and open statements.
18. The notion of sets applied to number.

19. The later development of the algorisms for computation using the properties of real numbers described in #5 above.

It can be seen that the modern program described above leads very naturally into the mathematics of the secondary school. The properties in number 5 above become the basic laws of elementary algebra. The gradual filling in of the real number line (see 6 above) with fractions, positive and negative numbers, and irrational numbers and later followed by the imaginary number axis perpendicular to the real number axis leads to the establishment of the complex number plane. With the complex number plane, all roots of equations in the algebra of the secondary school can be represented.

Most of the major curricular projects agree with the spirit of the description above far more than they differ. Some of these projects for the elementary school are: School Mathematics Study Group, Greater Cleveland Mathematics Program, University of Illinois Arithmetic Project, Madison Project, Stanford Project, and the Minnesota Elementary Curriculum Project. Some of these projects for the secondary school are: School Mathematics Study Group, Greater Cleveland Mathematics Program, University of Illinois Committee on School Mathematics, Boston College Mathematics Institute, The Syracuse University-Webster College Madison Project, University of Maryland Project, The Ontario Mathematics Commission, and the Developmental Project in Secondary Mathematics at Southern Illinois University.

Some people have criticized these programs as swinging too far toward abstract mathematics. Although it is true that the new programs look upon mathematics as the queen, rather than the handmaiden of the sciences, there is no valid reason for claiming that they are too abstract even for children. In the "queen" approach, the organizing basis of the new curricula is the mathematical structure of mathematics with its unity and interrelatedness. This is opposed to the unorganized social and business mathematics curricula of the past. However, the "queen" approach is not necessarily extremely rigorous or abstract. In fact, the new pedagogy of mathematics stresses carefully designed physical devices as aids to concept formation, discovery methods, appeal to intuition, and inductive approaches. Formal deductive methods of proof are evolved later. The new symbolism in contemporary mathematics programs is intuitively developed and is no more excessive or abstract than the formal algorisms of the past, or the three cases of per cent.

Criticis have said that the "queen" approach, in contrast to the "handmaiden" approach, neglects the important role of mathematics in the sciences. It is true that in the new programs, mathematical concepts are not necessarily introduced in the context of genuine scientific problems. However, in at least three of the contemporary secondary programs a strong effort is being made to deal with the important scientific applications of mathematics. For example, in the Boston College Program, the text "Sets, Operations, and Patterns" will have the companion textbook "Concepts of the Physical Universe for Man the Observer, Man the Experimenter, and Man the Mathematician." The School Mathematics Study Group has developed the following supplementary titles: "Mathematics and Living Things," "Radioactive Decay," "Applied Mathematics in the High School," and "Mathematical Methods in Science." SMSG has also produced revised texts for slower students.

The evaluation of new mathematics programs has been handicapped, as is often the case in curricular evaluation, by the lack of appropriate tests and measuring instruments. Too often, new programs are compared with old programs entirely on the basis of old tests. New tests based on the newer objectives need also to be designed and used in curricular evaluation. Then evaluation can show how successful the new programs are, not only on some of the older objectives, but also on a whole range of newer objectives. This type of new test development is a feature of the National Longitudinal Study of Mathematical Ability which is the evaluation part of the School Mathematics Study Group.

The existence of a variety of new and older curricula in mathematics makes the task of developing nationally used mathematics tests such as the College Entrance Examination Board tests and the Cooperative Mathematics Tests much more difficult. Every effort is made to reduce the element of bias for or against any one program. Technical language peculiar to one or a few programs is avoided. Great effort is made to develop a mathematically correct, but neutral language. Special topics not widely taught are avoided. Questions are written, reviewed by a representative committee, and then pretested before they are used. By these means, the fairest tests possible are developed.

In this talk, I have hoped to give you some historical perspective on change in mathematics education and to give you an up-to-date look at the essential characteristics of the current mathematics programs in the schools.

■ CHAIRMAN RELLER: I think it is appropriate that we should move from the field of mathematics to that of foreign languages for I suppose that if we want to consider the swing of the pendulum, certainly we will find it in both of these areas.

A very noted Dutch educator was in my office a couple of years ago. I had previously worked with her in Amsterdam and had known her for a good many years.

At the time she was with me she said that it was typical for Americans to "swing with the pendulum" and wish to do now, in foreign languages, what the Dutch have never contemplated doing, though for a hundred years they have taught foreign languages rather well they thought. I'm not arguing for or against these "swings." I'm not examining the question of how we can best achieve change or whether it is in accord with the inevitability of gradualness or wide swings.

This morning, to look with us at some aspects of this problem we have a man who did his undergraduate work in a university in China, who then studied here in journalism and finally took the Doctor of Philosophy degree in Chinese Literature and Thought at Stanford University. He has had a varied experience as a reporter, as an instructor at the Monterey Language School, as a Research Assistant and Lecturer at Stanford University, as a Professor of Humanities and Foreign Languages at San Francisco State and at present is Chairman of the Department of Foreign Languages there. He has also been active in the consideration of the foreign language program in the State of California. I might say that, in addition to the matters which I have already mentioned, his major interest is in poetry. I think this is a very good base from which to be operating as we look at some of these problems. It gives me a great deal of pleasure then to present at this time Dr. Hsu who will discuss "Articulation Problems in California Foreign Language Instruction." Dr. Hsu.

Articulation Problems in California Foreign Language Instruction

KAI-YU HSU

The Problems Observed

In American college education, gone are the days when a Socratic peripatetic could spend long years with a handful of disciples to mold their pattern of intellectual growth from adolescence through adulthood. Cold, impersonal, stainless steel façades have replaced the cloistered covered walks. Microphone and television screen are here to stay between the teacher and the student. And yet, no amount of nostalgia for a vanished golden past is going to do any good. It was exactly eighteen years ago that I went to work for a

newspaper in Chinatown in San Francisco where the residents were in the habit of picking up their telephones and asking for their parties by first names, sometimes even nicknames. And the operator would be able to connect them without fail. With much pain and persuasion, I instigated a newspaper campaign to change to the dialing system, all for the sake of efficiency and progress. With this memory still fresh, what could I say to a dean who argued for the installation of an IBM system whereby every one of the 16,000 students on my campus was to receive a number and henceforth be identified only by that number.

The number of students turned away from the door of San Francisco State College alone at present stands at over 7,000 every semester. Within the foreseeable future this figure will grow. Along with this growth will continue the trend of depersonalization in education. The entire process of education has been, of necessity, more closely paralleling an assembly line. The frightful prospect of a teacher seeing himself stationed at only one point on this long conveyor belt to apply his screwdriver or paintbrush only for a brief moment before the article moves on to receive another finishing touch from another teacher, has already become a reality. In this situation, small wonder that we educators are compelled to address ourselves to the question of articulation. If we cannot change the pattern of progress altogether, at least we ought to try to insure that the conveyor belt is a continuous one with no break on the loop.

Unfortunately, when we turn to look for the continuous loop, we cannot even find the conveyor belt. Certainly, if there was a belt, very few students succeeded in seeing it. The foreign language programs in this country at the various levels each started in their own ways for their own purposes. There has been very little, if any, meeting of the minds about what the programs at each level ought to be doing, and there has been certainly no more agreement even among the schools at the same level. At the risk of stretching the same metaphor to the breaking point, the various parts of what ought to be a machine have been cast in various shops with no over-all design as a guideline. Naturally, there could be no conveyor belt to assemble them.

California's foreign language programs have shared the nation's common ills in foreign language instruction, and these ills have been compounded with certain local maladies. Scanning the situation of today in this state, what major problems do we discover?

The first and foremost difficulty with which we are confronted is the question of objectives. Each institution has its own tradition, and tradition is usually bound with very tough hide. Most of the collegiate foreign language programs are still almost exclusively literature-oriented. A student graduating from one of these programs is expected to know a lot about literature, its style and analysis and criticism. He is expected to be very conversant with the names and dates and major works in a literature which he must be able to articulate in English. Whether or not the graduate is able to participate in a sophisticated discussion of literature in the foreign language is of very small concern. Consequently, a student can do very well and graduate with a major in a foreign language if he is well read in comparative literature and in secondary, comparative interpretation and criticism of the literature in the English language. This is particularly true of the relatively less taught languages in this country. As recently as last October, a well-known scholar in a foreign language field expressed himself at a high level conference at Princeton University, that he would not wish to see the literature in a foreign language sacrificed which he believed was bound to happen if a course in that literature had to be taught in that language. Indeed, I find the line very hard to draw between the advanced courses in foreign language and literature and those in comparative literature, although they fall under two different departments in most institutions. Some professors with a serious desire to enable their students to learn the foreign language a little more, insist on dealing with the original texts closely, but in so doing they turn their classes into mere translation exercises and sessions of exiguous study. They may deal, with painstaking care, with the lexical items, syntactical features, or even etymology and the philosophy of the language of the passage at hand, but they fail to treat it as literature. These professors expect their students to have the kind of preparation suitable for this type of operation.

To prepare students for this kind of college experience, the secondary school programs used to give their students much grammar analysis and reading. As the secondary school teachers were prepared through the same kind of college programs, they were ready only to do the same kind of job. If nothing had happened to disturb this world of blissful self-content, the tradition would have been perpetuated forever. But the world did change, and the Russian Sputnik was shot up in 1957. With a sudden upsurge of demand for

foreign language students to be able to use the language in live situations in the modern world, the secondary schools being less tradition bound reacted more sensitively to the needs of the time to modify their approaches to foreign language teaching. The situation is parallel to the introduction of modern living into a primitive society where the simple innovation of covering up the woman's bosom actually created a total disintegration of the entire cultural fabric. Now pandemonium has broken loose. Those high schools which have adopted the so-called modern approach to foreign language teaching by stressing speech and fluency, have found their graduates at a disadvantage when they have to compete with the other students trained in the traditional method in a tradition-bound college program.

This was just the beginning of the articulation problem. Immediately connected with this diversity of objectives has come the problem of placing the high school students in college programs. The high schools in California have been writing frantically to the colleges to inquire how their students would be butchered upon their entry into the college program. Should their students, having completed a four or five year sequence of study in a foreign language, be permitted to enroll in the third or fourth semester of the same language at the college level, or should they skip the lower division language classes altogether to embark upon upper division work immediately? If they were permitted to do so, and if they proved themselves to be capable of following the advanced level courses in literature at the college level, should these same students be permitted to claim college level credit for what they have covered? If they were able to do so and able to claim full credit, would this mean that a good high school student, having completed four years or more of training in a foreign language, could literally graduate from a college with a degree in that language in two years time or less because the regular college major requires only four years of study? On the other hand, if a high school graduate with four years or more of a foreign language cannot join the advanced classes at the college level, is he permitted to repeat the lower division college level courses? If so, should it be considered remedial work for him and consequently earning no credit? To give no credit for this kind of apparently remedial work would do injustice to those students whose language study at the high school level is inadequate not due to their own fault but rather the fault of the program itself.

And yet, giving credit for this kind of study would encourage many students to try to place themselves purposely in a language class in college lower than their level of accomplishment in order to earn easy recognition. Furthermore, there is a question about whether or not language skills are properly part of the secondary curriculum, hence deserving no college credit.

A second related problem occurs in the junior college program. The junior college in California is legally the thirteenth and fourteenth grades. It is authorized to offer only lower division classes. If a high school foreign language student, having successfully completed four years of training, enrolls in a junior college, what can he study? Theoretically, the junior college has nothing to offer to this student. Thus, unless the function of the junior college curriculum is redefined, and the artificiality of the line between the so-called upper-division and lower-division courses is removed, such a high school student will have to suspend his study of the same foreign language, or merely take some courses which would only enable him to maintain his level of achievement but not to advance it any further. There is a serious objection on the part of the four-year colleges to permit the junior colleges to offer more advanced classes which are substitutes for the advanced work in the four-year college curriculum. The fear has been generated by the possibility that once this happens, the four-year college would lose control over the substance and coverage of a foreign language major. If the problem is not solved a student having learned a foreign language well at the high school level will be forced to suspend it for at least two years while he is going through his junior college career.

We always hope that the students will do better than the teacher in the end, but these outstanding ones do not amount to over five per cent of the total in each student generation. The rest, 95 per cent, turn out to be, as usual, various degrees of imitation of their teachers. It has already become a habit, perhaps rightly so, that any search for the roots of foreign language instruction problems always winds up with the teacher to blame. Being teachers ourselves, we are ready to take the blame. What kind of foreign language teachers are we and what kind of teachers have we been training for the schools? There are those very sophisticated in a foreign literature but extremely rusty in their use of the foreign language. There are others with a native speaker's facility in the foreign language but rustic in handling ideas and abstractions in the literature. This is

the wide spectrum that forms the broad base of the triangle. The apex of the triangle is occupied by the precious few who combine the two extremes. Recognition of the fact that all the future teachers of foreign languages must first be given solid training in the languages before they can be expected to acquire a useful command of and a valid insight into the literature has been coming along quite slowly. As recently as last month, when the chairman of the foreign language departments of the California State College System met for the first time in four years, the battle line was still taut between the worshippers of literature and the advocates for linguistics. The gap may be slowly closing, but there is still a gap wide enough to trap many students.

Even if the teacher training programs somehow got together and standardized their terminology with regard to course requirements, course descriptions, and number of units, what each program can achieve still remains unknown because the instructional effectiveness and the pedagogical approach of these seemingly equivalent courses will remain unknown. Turning our attention to the unknown, those of us concerned with the identification of professional standards realize that we need to learn first what is actually happening in the field of foreign language instruction. This means a continuous process of gathering data and analyzing and interpreting the information gathered. The heavy flow of correspondence across my desk testifies to the general hunger for such usable information. The elementary school asks the high school how it should arrange its foreign language sequence in order to feed smoothly into the secondary level. The high school asks the college how much credit its students could expect when they enter the college curriculum. The junior college wants to know if certain courses they are offering have equivalence in the college. The college wonders if it is asking too much or too little of its foreign language majors when the university program seems to be asking for something else. How can these questions be satisfactorily answered without some reliable instrument of measurement for both the quantity and the quality of the various parts of these programs?

The Causes

Now that the foreign language teacher is personally under the spotlight, and he writhes and reels more noticeably under the public eye, it does not mean that he is the only educator having loads and

loads of trouble. For if we begin at the beginning, the most fundamental cause for much of the foreign language teacher's woes lies in the disproportionate recognition given to what good education means and the price it exacts. It is not realistic to expect the number of contact hours in foreign language instruction to mean anything specific when every high school teacher in this country is required to teach at least five hours a day. The difference in effectiveness between the first hour and the last hour of oral drill on a school day needs to be but is not recognized. The size of a class ranges from a minimum of 25 to 45, when 15 is the optimum figure accepted in the profession. Wherever the third or fourth year class falls below the figure of 25, the classes are combined to present literally multi-level problems to test the ingenuity of the teacher. With all these limitations and variables, how is it possible to expect a foreign language class to achieve certain definite levels of uniform accomplishment after a certain number of years? Once explained, the public agrees that it is unreasonable to expect this, but it proceeds to condemn the teacher as if he were the only one responsible for all the troubles. Thus, until the American society is ready to pay the proper price for quality education, any effort to articulate among the levels of programs can at best be a temporary relief of the symptoms, not to be taken as a substitute for a real cure.

Besides the logistical problem, there is a still tougher one, the philosophical problem. Just exactly what do we expect education to do to a student? The humanist has one answer, and the empirical scientist has another. Foreign language instruction can equip the student with a useful skill; it can also give him a broader intellectual horizon without necessarily giving him a usable skill. It is noble to say that every program should be planned to serve both ends, but both ends do not always find a common ground in every course in a program. Consequently, there are varying stresses and slants, emphases and balance of emphases. Most of the quarrel over how any foreign language course should be taught principally stems from these different philosophical points of departure. Take the culture course, for example. Every foreign language teacher agrees that such a course is essential and should be included in every foreign language program. But that is where the agreement ends. Beyond it, some teachers want to make the course an intellectual history, while others prefer to treat it as a sociological analysis, and still others see no other duty in this course than teaching the students

relatively advanced conversation and composition. When we see a course entitled "The Culture of France" or "The Civilization of the Spanish Speaking World," we have no way of knowing what goes on, and we have no way of equating it with another course under a similar title in a different program.

Ultimately, it is the society's value system that pronounces the final verdict to tell good education from bad education. Ideally education is to produce doers who are at the same time thinkers, and foreign language instruction is to produce competent users of the foreign language who are at the same time literary critics and cultural historians, the ideal being always somewhere in the future, while we having to live in the present, have to face the choice between a doer and a thinker, between a foreign language user and a literary critic of that foreign literature. Time was when only a literary Levite was credited for knowing a foreign language, and even now the best teacher of foreign languages still has a hard time to win that measure of scholarly recognition which is his due. Viewed in this light, the articulation problem becomes one of society's searching in its own conscience to make up its mind about ascribing equal values to different kinds of excellence.

These are the general but fundamental causes of the problems. In California a few local factors have aggravated the situation.

There is something to be said about the wild west spirit in California. It has been said that California, with all its Spanish past, a persistent Oriental invasion, a northern coastline dotted with Russian forts, and a fishing fleet manned by Sicilian speaking settlers, really has no tradition. If it has any intellectual tradition, it is the tradition of defying tradition, always pulling up its tent pegs in search of a greener pasture. The development of California education certainly reflects much of this spirit. There is only a very small minority who strives to imitate the New England aristocracy, but most Californians recognize the utility of the speech of the Mexican braceros and Chinatown "Chinks." The fact that the state could pass a law requiring foreign language instruction at the elementary school level reflects more of the local sentiment than a rational recognition of national interest. This local factor prompted California to react sensitively to the new wave of foreign language instruction started a bare decade ago to stress the mastery of the modern speech. Acceptance of this trend at the popular level is mirrored in many public policy statements. The California Association of Secondary

School Administrators, for example, recently distributed an official memorandum to the State Colleges, warning that foreign language teachers not trained in the audio-lingual method are out of date. However the term audio-lingual may have been understood or misunderstood, the public image of a successful foreign language instructional program in California is that it teaches students to speak the language fluently. This is to the good. However, before the public demand for results is translated into concrete logistical support for an educational program, the pressure is on the school administrator and on the teacher. The result is what I described awhile ago: the classroom teacher is being asked to perform better than he did before, but under the same physical restrictions and limitations. So there is a law, decreeing that all the elementary schools must teach a foreign language by such and such a date. So the school administrator reacted by resorting to all sorts of make-shift arrangements because no appropriation has been written into the legislative mandate. There are extreme cases where a school district makes a quick check through its personnel files to spot two or three teachers with several units of Spanish on their records, and assigns them to begin teaching the sixth graders Spanish the following semester. One joke that has been circulating around is about a teacher who has been assigned to teach Spanish simply because his name sounds Spanish, even though he was born in Milwaukee, and California is the most Spanish-cultured area he has ever visited in his lifetime.

The tendency in California of rushing toward Spanish, especially at the elementary school level, is certainly not helping the articulation problem. In the first place, there could be more poorly taught foreign language classes in this state during the next five years than have been observed anywhere else on earth, and these programs simply cannot be properly articulated. In the second place, the same tendency generates pressure on foreign language programs other than Spanish, truncating their growth in some cases and elbowing them out of business in others. Today, in California foreign language instruction, 99.5 per cent of the programs at the elementary school level are Spanish.* What the rest one-half of one per cent consists of I don't know, and it doesn't seem to matter. Over 60 per cent of secondary school foreign language instruction is in Spanish. About 30 per cent at the secondary level is in French. The rest of

* In 1961, 180,091 of the 187,294 FLES pupils were studying Spanish.

California secondary school foreign language programs are divided among German, Latin, Russian, Italian, Chinese, Japanese and Hebrew with a small fraction for each.* Clearly, there is no articulation problem for these relatively less taught languages in California, because there are no programs to articulate.

Some Corrective Steps

If all these sound altogether too gloomy, I must declare that in the sunny state of California every patch of rainy cloud has a silver lining. Certainly I am not the only educator who views the situation with alarm. A number of corrective and preventive steps have been taken.

There has been erosion in the walls of non-communication. The two foreign language professional organizations in the state have brought together mainly the State College, Junior College and secondary school teachers of foreign languages. Foreign language teachers of elementary schools, a newly arisen group, are beginning to work closely with the other three segments of the education system just mentioned. Three years ago, the state-wide articulation conference appointed a Standing Committee to work on foreign language problems. On this committee, all five segments of the schooling system in California are represented, thus involving the university level as well. The machinery in the Department of Education of the state government was reorganized last winter to facilitate a vertical articulation. The elementary, secondary, and junior college foreign language specialists there are now able to talk to each other, learning from each other about their respective special problems. Through such intense, criss-cross, inter-communication, both vertically and horizontally, the articulation problems I outlined at the beginning of my discussion are being scrutinized. And through the continued dialogue and colloquia, some pattern of events to come seems to be emerging.

One of the most encouraging signs is the gradually emerging general recognition that the desirable level of achievement of a program can be both qualified and quantified. To be sure the job is not an easy one, but it can be done. There is a concerted effort being exerted at the various levels of foreign language instruction to do precisely this job. Toward this end, the efforts are being supported

* In 1963, total secondary Foreign Language enrollments were 386,579, of which 209,390 were Spanish, 103,319 were French.

by the accomplishments of institutions such as the Educational Testing Service. The California State Department of Education has already adopted the Modern Language Association tests for teacher certification under certain conditions. It is very likely that the same standard of certification may be used in the near future for all teaching credential candidates regardless of how they have acquired their preparation. It will go a long way toward the establishment of certain valid and uniform standards in the profession, which in turn will facilitate the articulation of programs at various levels. For placement and for measuring achievement, many institutions are currently experimenting with the MLA Cooperative Tests. Most of the graduate schools have adopted the ETS foreign language reading tests. The foreign language professional organizations and the articulatory agencies in the state are currently working diligently to build up popular support for adoption of the tests.

Although not enough progress has been made yet along this line, there has been some serious effort to differentiate the types of foreign language programs for different objectives. One such important distinction to be recognized is the line between an ideal foreign language program for college-bound students and another for students whose high school education will be terminal. When these different types of programs are established in California the complexity of articulation problems will be considerably reduced.

Besides adopting standard tests and differentiating types of programs, a third development is afoot in the Foreign Language field to help improve articulation. The colleges and universities are planning "transfer" courses for freshman or transfer students whose foreign language background has to be adjusted before they can be fitted into the college sequence. The courses may be offered as remedial, or special summer study programs. Whichever way they are offered, they will ease the articulation difficulty.

I am quite aware of the unavoidable reaction to these commendable efforts to set standards for articulation. In my ear have been ringing the loud cries against standardization, regimentation, and centralization. There will continue to be such protests, principally from the college and university quarters, which are essential to the continued free exploration of ideas and methods in education. However, the very fact that there is need for inter-communication toward a properly articulated sequence of language programs points up the diversity of policy and practice in the language field in all segments,

particularly among the university and college campuses. Diversity is fine but chaos is intolerable. The university and college programs are supposed to set the tune to which the entire academic community dances. But since at present each campus has its own musical scale, there is no common tune to which the high schools could dance. The result is inebriate kinetics, a nightmare to every conscientious foreign language teacher. It is true that we have to maintain some intellectual monasteries where a few Socratic peripatetics can continue to conduct their independent, nonconformist search for the unknown. But we cannot afford to ignore the intellectual welfare of the 400,000 college students in this state who deserve the best we can afford. And certainly the best we can offer them is not a chaotic inarticulated foreign language sequence. I am convinced that among our fellow educators, the professional conference goers (the fraternizers who jump on every popular bandwagon and echo every education fad) and the isolationists who say "public be damned," are really a very small minority. The majority of us do not believe that intellectual excellence and educational standards are incompatible. Consequently, well articulated foreign language programs in California are not visionary but realistic goals which can be reached.

■ CHAIRMAN RELLER: I suppose that one of the real dangers is that we may well adopt tests long before we work through the philosophical questions or determine what the objectives of instruction are.

As I think of this problem I am impressed at how culture-bound, in a sense, all societies are. I recall some seven or eight years ago when a citizens committee in France—and the idea of a Citizens Committee was rather revolutionary in France, may I say—took a look at and reported on some educational problems. When it brought in the report urging the discontinuance of the baccalaureate examinations it stirred up a great deal of turmoil. I recall being interviewed by the representative of one of the Paris newspapers. He wanted to know if it was true, as had been said in this Citizens Committee Report, that in the United States there were no external examinations regularly employed. He just couldn't understand how any school system could function at all under these circumstances. Why do teachers teach? Who keeps them doing anything, constructively, about working toward standards? This thought was very, very threatening to him. I think if he had heard Dr. Hsu, he might have concluded that at least in the foreign language area we were not achieving very much.

This is certainly a very good background and indicates the size of the problem that confronts us, for, I repeat, it will be much easier to arrive at an examination than it will be to really work through the philosophical bases of action in such a field. And I suspect that this kind of rather quick solution may, in the long run, have difficulties just about as great as previous solutions. And so different societies, each one culture-bound, more or less, move back and forth with reference to this educational problem. I think one of the things that we need to recognize about this educational revolution is that it is not confined to our society. It's going on all over the world, and can give us some measure of security, perhaps, as we struggle with these extremely difficult problems.

For our third presentation this morning we are going to turn to an issue, a subject that grows out of these two earlier presentations, a consideration of the problems of "External Examinations and Continuity."

We are fortunate in having with us for this presentation an individual who is director of the Advanced Placement Program of the College Entrance Examination Board. Before joining the staff of this group he was Associate Dean of the School of General Studies at Columbia University for a period of nine years and Associate Director of University Admissions and Lecturer in English at Columbia. I might say that his undergraduate work was done in Columbia College where he both played varsity football and was elected to Phi Beta Kappa. This should qualify him to handle this extremely difficult subject. Mr. Arbolino.

External Examinations and Continuity

JACK N. ARBOLINO

The College Entrance Examination Board has established a Council on College-level Examinations. This action is the result of long interest and, more recently, intensive study of a set of special problems. It is also the formal beginning of what may be the most exciting project the Board has ever attempted. Simply stated, the plan calls for the development of a national system of placement and credit by examination. The concept is vaulting and success is not assured but who can deny how dubious a distinction is a record of success so heavy in itself that it encumbers flights of aspiration. In short, the Trustees of the Board, who evidently suffer very few constrictions of the heart, seem to agree that the Board's hope should exceed its grasp or what's our charter for?

We aspire through the Council to do no less than improve access to higher education, to facilitate mobility and individual development, and to provide better utilization of human resources. In short, we hope to use external examinations to aid continuity, or, in more specific terms, the Council will try to meet some distinct but clearly related needs: the needs of able secondary school students, currently a concern of the Advanced Placement Program; and the needs of transfer students and off-campus, or unaffiliated students.

If the satisfaction of these needs is not worth nearly all we can give, the mere existence of them seemed at least a compelling rationale for study and action. There has been study, the Trustees have acted, and I would like today to tell you some of the background of the project and some of the tentative plans for it.

For many years we have been interested in and sensitive to problems of transition and placement at levels other than the traditional one between school and college. In 1949 we developed "Intermediate Tests," a testing program for transfer at the end of the sophomore year. It failed. Part of the original battery, the aptitude section, was continued in 1951 as the College Transfer Test. This program also failed to gain wide acceptance and was abandoned in 1955.

In 1960 a member of the staff wrote (forgive me now for here, alas, I stoop to quote myself):

> We must scrutinize credentials and devise tests that will yield enough information to enable us to certify, place, and divide into sections *all* students in *all* subjects from grades 11 to 14 and maybe beyond. The development of such a testing program is a frightening thought and a tremendous task, but I know of no more important job in American education. Admissions and placement must be refined where they have been rudimentary, protean where they have been procrustean.[1]

Background

The College Entrance Examination Board may be the agency best suited to try to develop a national system of placement and credit by examination.

If the Board, with help, is equal to the task it is because of its power, scope, and governmental structure. The last makes acceptance meaningful and execution possible. Experience, a reputation for competence and objectivity, a record of success, and even the tinsel of prestige—all these are characteristics or trappings of the Board. However, only our members give us life and only their concerted actions give us power. In the past they have given much of both. Now we need them both again.

There have been other tries and other investigations, some limited and some inconclusive. This is no derogation of earlier attempts; none has been quite like the one we contemplate now and many will contribute much to it. The others come from places as close or far as Buffalo or Redbrick. Many of them show the work of imaginative and experienced educators. It seems clear that none will yield all that will be needed, for the Council's program will be national, it will consist of more than just a battery of tests, and it will be as adaptable to the changing pattern of preparation as we can make it.

It should be stated that the Board did not seek this responsibility; neither has it been thrust upon us. To trace and identify the proclivities and pressures that combine to make us move would take a wise and devious historian—and more time than we can spend. A balance of pulls and pushes meets the moment so that now the effort, manifest and worthwhile, is being made.

One such moment can be told—it may suffice.

The Committee on Institutional Cooperation—The Big Ten plus

the University of Chicago—with encouragement from the Carnegie Corporation had been engaged in developing a plan for work with unaffiliated students. On June 8, 1964 the CIC was visited in Chicago and the Board's interest in the project was discussed. In a letter to the President of the Board dated June 26, 1964, and signed by the Executive Director, the following action by CIC was reported:

> The CIC (1) voted to dismiss its own Committee on Testing; (2) further expressed CIC appreciation to the Carnegie Corporation for the confidence placed in CIC in suggesting that it undertake the testing project and expressed regret that it has been unable to implement the original testing program; and (3) noted its feeling that the problem represented in the previous CIC proposal is still of utmost importance and its belief that a competent and experienced organization such as CEEB is an appropriate body to devote its attention to the question.

The Need

About this project it has been said, if there is no need, lead. It has also been stated, it would be calamitous not to do it. At the other extreme, prudent observers who look at it plainly say, "Where's the clientele?" or "Stay out, it's a swamp."

From *The Ring and the Book,* and Rashomon, or the current Hollywood version which does it with cowboys, we learn there has never been a better device for drama than that of two men who look at the same thing but see it differently; but that's no way to run a testing organization. Statistics, opinion, and rhetoric abound and with eloquence enchanters can lend forecasts the semblance of reality. Nevertheless, the best thing to be said is that the demand for services is difficult to predict. The need may be something else.

Preliminary Plans

In barest outline the plan calls for the establishment of a Council on College-level Examinations which will sponsor an examination program. The Council will be supported by two committees: the Advanced Placement Committee and the Special Student Committee.

In formulating general plans those concerned have felt that the Board may be looked to for program activity at the college testing level because: (1) it represents a means through which the interest of college and university faculties in examinations of appropriate standards can be expressed; (2) as an agency of the colleges it is disinterested as well as external; (3) it should be capable of pro-

viding and identifying examinations of integrity. The important function of identification must be understood and emphasized. It is not now a part of any Board program. The Board has with ETS conceived, developed, administered, scored and graded, analyzed, and described various tests and examinations. But it has not sanctioned for its use any but its own. It does not identify and endorse for action with any of its constituency a test in no way indigenous to Princeton or New York. This is now proposed. It should be part of the Council's task to identify and use the best tests it can find no matter what their origin. This provision is to take account not only of such activities as the New York State College Proficiency Examinations, ETS's Comprehensive College Tests, and others, but by extending endorsement and by allowing for the exercise of free selection it can assure the Council of the best choice of tests and broadest coverage of subjects. Of course unnecessary duplication of effort, in the form of needlessly overlapping examinations, could result in a triumph of confusion that would leave chaos institutionalized if not enthroned. Duplication should be avoided but diversity which genuinely parallels the course offerings of American colleges and universities should be sought.

The amalgamation we are seeking, however, must not proceed to the point where the needs of able students in the secondary school are indistinguishable from those of the special student. There are unique circumstances in both divisions which, in the case of the Advanced Placement students, must be preserved and which, in the case of the others, must be considered. The virtues of advanced placement should not be cloistered but there are singularities which arise largely in the form of supporting activities and, typically do not bear directly on the nature of the examinations. For this reason it seems necessary to provide for two separate program activities: Advanced Placement Program and what we may call Special, both under the general guidance and advice of the Council.

The Council might have seven main functions: (1) to formulate standards that examinations should meet in order to be appropriate for credit, placement, or transfer; (2) to apply these standards and identify the examinations wherever they may be; (3) to sponsor new examinations where there are none or where those that exist are inadequate; (4) to advise the President on all activities supporting the examination program, specifically including services in guidance, administration, evaluation and research and information; (5) to work

to effect within colleges and universities that acceptance of the Program which will assure successful candidates proper recognition and reward; (6) to advise the President on the coordination and the work of the two subordinate programs; and (7) to engage in various experiments in credit by examination.

The members of such a group must be good enough not only to do but decorate their work. It has been visualized essentially as an academic body made up of faculty members and academic deans from both two and four year colleges.

Much can be learned from the Advanced Placement experience; to cite just one example, the use of the annual subject conferences to gain school and college acceptance of the Program. It seems obvious, too, that one small heresy of the Advanced Placement experience—recognize achievement no matter where or when it occurs—should serve as canon for the Council.

The Advanced Placement Program has analogues at both levels; Council and program committees. It knows some of the paths and some of the pitfalls of the examining phase as well as the promotional phase. And if only because it precedes the Council in the chronology of Board programs it seems sensible to look to it for all the help it can give, and at the same time make sure that not only are its activities in no way diminished but actually furthered and enhanced.

Preliminary plans call for the provision of general guidance services. These services would include help for transfer students as well as unaffiliated students. The Council must study how the University of London meets this problem. It should consider the use of university counseling centers; public libraries; various service centers and the numerous national educational agencies.

Informational publications will be essential, so will a transcript service. If one of the basic functions of the Council is to affect within colleges and universities that acceptance of the program which will assure proper recognition, the plan to gain university cooperation should be recognized at the outset as vitally important. It is all right to let truth be in the field but it sometimes needs help. This is not to say there should be a great campaign to convert faculties by bombast and pamphlet. The thing itself, not the description of it, is all that is ultimately important and although the program may well lend itself to flights of rhetoric and spurts of legitimate publicity, nothing is more odious to many an inner academic man.

If then the Council sees university cooperation as vitally important, it must plan carefully to enlist bellwethers. You name them. The Council must make the program good enough to engender in teachers and administrators the kind of interest that will make them feel a personal sense of responsibility for its welfare. It must get from the Advanced Placement Committee its own appraisal of the similar effort in that area, where it failed and where it succeeded. It must demonstrate and always maintain the program's absolute quality. It must pretest, evaluate, and provide opportunity for review. It must be as careful and as fine as the Advanced Placement Program.

Finally it is planned constantly to cultivate a commitment to this program that will encourage the academic community at large to contribute its talents, wisdom, and effort. This can be done if the program is the best thing it can be and, paradoxically, if those in charge of it never claim too much for testing.

Some of the Problems

Can the interests of the junior colleges be furthered through the Council and its program as envisioned thus far? If the Council cannot help it certainly should not hurt.

To what extent can institutional self-evaluation be accomplished through this program?

Can an examination series serve multiple needs: admission, placement, and evaluation?

How far and how fast should the Council go to serve the variety of objectives of the junior colleges?

There will be no shortage of questions and subjects for research and study; for instance, within a university where, really, does the authority on credit reside? The Advanced Placement practitioners have been seeking that answer for ten years and it remains elusive.

How does the Council effect within colleges that willing suspension of disbelief or red tape that will result in honest appraisal?

How does it, concerned as it will be with examinations and credit, keep primary emphasis not on testing but on learning?

How does it find that best balance between essay and objective material?

How does it take its stand on "influencing the curriculum?" One observer recommends that from this project should come a bank of examinations on which faculty members may draw for standardized

end-of-course examinations. Another describes the Board's current posture as neurotic: the SAT, and the achievement tests dealing with aptitude and achievement, do not influence but measure, or do they? The Advanced Placement Program clearly tries to "influence." Will the other examinations of the Council only recognize and measure?

And does the Council, concerned as it must be with rigor and quality, keep standards reasonable?

A more subtle area of concern is the American concept, as distinct, perhaps from the British, of the worth of "the course." This problem is similar though not as simple as the one the Advanced Placement Program faces when it encounters a professor who feels that no combination of secondary school course, high school teacher, and national examination can equal his course. It will be more difficult to encounter a college teacher who, accepting the premise of the external examination, still retains the personal set of criteria he would have injected into the hypothetical course had it been his.

What can the Council do to ease residence requirements?

Is there a palliative for the small college which may, by full participation, see a decrease in tuition income?

There are undoubtedly many other problems still unseen. It seems clear too that the project will require the Board's very best effort and even getting it, may falter. If this were to happen the only solace might lie in the belief that it is better to falter or even fail than to shirk a responsibility.

The Trustees were unanimous in their recommendation that this work go forward. The Council has been appointed and an Executive Director has been named. The submission of proposals to foundations for developmental work has been authorized, and periodic reports will be submitted by the President during the next three years.

The Trustees were enthusiastic as well as unanimous. Nevertheless everyone concerned with the project realized that the Council will face some formidable issues. We accept that. Joseph Wood Krutch has said when we assay testing or any form of human endeavor the proper observation we should make is not Pavlov's "How like a dog," but Hamlet's "How like a god." I mean no blasphemy, but basically that is what this is all about—aspiration, and access, and continuity.

Can we bring it off? Well, if it isn't easy it might be impossible—

it's just that difficult. But it will work and when it does the College Board will be contributing to an important reconciliation in American education. Increasingly we seem to seek universal education and quality too. Maybe a clear intention powerfully shared and executed with insight, initiative, and faith can effect the equality of opportunity and excellence we always promise. We are forever confronted with bristling alternatives: the liberal or the useful, the ivy or the junior, past or present, God or man, and the lists are endless and the rival claims are legion. But how do they bristle and how are they rival? The Council can begin by taking some things out of opposition; it can recognize the strength in diversity. It would be asking too much to see one day the adherents of social responsibility and those of academic detachment truly reconciled—that may not even be important—but those who must worry about the whole of education, and the Board is among them, had better see the worth of both camps, for truly to treasure learning is not only to transmit it, but to recognize it and see it used.

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[1] Jack N. Arbolino, "Establishing and Maintaining Better Curricular Articulation Between Secondary and Higher Education," *Current Issues in Higher Education* (Association for Higher Education, NEA, 1961), pp. 149–50.

■ CHAIRMAN RELLER: I had the feeling this morning that we had recessed on a note which recognized the enormous difficulty of the problem which confronts us. It reminded me a little of a story I heard just a week ago at a Seminar dealing with problems of communication and the difficulty of really winning in these difficult matters. Two young men had been out of college about five years when they met. One had married and the other had not. The one who had married said to the other, "Why haven't you married?" "Well," he said, "I've wanted to and I've made many efforts but when I found a girl whom I liked I would take her home and my mother would disapprove, so I didn't marry. But, one night at a dance hall I met a girl who was just the girl. I knew she was the girl because she looked like my mother, she talked like my mother, even her nose had a little up-turn just like my mother, so I thought that now I really would win. So, I introduced myself and eventually took her home and then my father didn't like her." So, our problems are difficult.

This afternoon we are going to turn to a couple of additional matters, the first of which deals with the matter of "What's in a Norm—Testing What We Really Teach." For this presentation we have an individual who has been active in teaching and administrative work, largely in Washington and Oregon, has been active in curriculum and planning activities and who for the last five years has been deeply involved in the Metro Testing Project. He has served on the Statistics Committee and helped to plan and implement the selection and construction of this new battery. It gives me a great deal of pleasure to present Mr. Keezel who will discuss this problem. Mr. Keezel.

What's in a Norm —Testing What We Really Teach

E. L. KEEZEL

Before we talk testing I'd better bring my biases out in the open. Achievement tests should measure learning—what supposedly takes place when we teach. They should be accurate and appropriate. When I look at a test score as a teacher, I'm often not too sure just what that score means. What did the test measure—how well—how good a job did the student do to earn this score—compared to whom? What reasons do I have to consider this score along with my own judgment of a student's accomplishment?

We need an objective yardstick to measure teaching, one which involves reasonably manageable variables. We need to be able to agree that a test measures what we want to teach. Just any standardized test will not do this. National percentile scores in my area

are too high or too varied to make the tests very useful for guidance and curriculum work, though they might be good for publicity. (This results, of course, from our superior staff and students, though some people might mistakenly consider this to be a bias.)

It is customary to cite authority for ideas or procedures, so I should like to offer two sources—both brief, both well done and both useful in practice: (The authors of the first may or may not be recognized here, but they enjoy considerable prestige elsewhere.) Henry Chauncey and John E. Dobbin, *Testing, Its Place in Education Today* and Kenneth F. McLaughlin, *Interpretation of Test Results.* I wish to offer a few quotations from these works, but this is a project report on the Portland-Tri-County Testing Project, not a research paper. What we offer is not necessarily ideal—philosophically or experimentally—but we believe it to be sound, and it has been working for us.

Chauncey and Dobbin provide this to help us develop a rationale:

> "The final step in building an achievement test is one that teachers find practically impossible to accomplish with the tests they make themselves. This is the process of testing large numbers of students so that there can be reference groups with which to compare an individual's score and give it meaning."*
>
> "Because of the practical difficulties that stand in the way of the teacher who seeks to obtain norms on his test outside his own class, almost all teacher-made tests are limited in their interpretation to class norms."*
>
> "Comparison data, test performance information about a lot of other similar students, are especially important when the performance of a particular student or class is to be interpreted."*

Chauncey and Dobbin go on to point out:

> "Comparison with class data has the most meaning because it shows how well the individual has done his test job in comparison with other students who have had the same teacher, textbooks, and curriculum. Comparison with system data lines him up in a still larger but somewhat more heterogeneous group. The comparison becomes more difficult to interpret as the group with which the student is compared grows larger and less homogeneous. The so-called national norms are the least useful of all because one so seldom knows just what kinds of students are in the comparison groups."*

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* Henry Chauncey and John E. Dobbin, *Testing, Its Place in Education Today,* New York, Harper and Row, 1963, pp. 47, 49.

McLaughlin tells us:

> "Local norms are established on the basis of the same students within a smaller area—a state, county, city or school. If norms are constructed for the same students for several tests at the same time, they will be comparable. Also, these local norms compare the student with his peers in his own community." *

McLaughlin also says:

> "Since achievement tests can be helpful to teachers, it is important that such tests be selected with care. Before a final choice is made, the test content should be compared with the appropriate curriculum to determine whether the items included are covered in the local program and would be fair to the students." *

Basically, the Portland Metropolitan Test Project, or more affectionately—Metro Testing—has dealt with these problems:

Norming and Standard Score Reporting for the Metro Area
Test selection and construction to conform with the area's curriculum

The Metro Project began in 1959 to attack these problems. While I do not wish to use up too much time with background material, a few credits and comments are in order. Many people have been involved, but three have been the real prime movers since the inception of the project: Dr. George Ingebo of Portland, the late Bernice Tucker of Multnomah County, and Warren Adams of Clackamas County.

In 1959, almost all the schools in our area were using standardized tests—generally the same ones. However, many of us found that the list scores and confidential score reports from the publishers gave us some pretty negatively skewed distributions. In my area 60 per cent of our graduates start college. To add to this already unrealistic pressure for higher education is not really fair or honest. Page after page of 99th percentile composite scores, with the bulk of each class at or near the level where the student should plan to go to college—according to the publisher—can make things a bit sticky. For good measure, it was an expensive program.

Some schools found it necessary to adopt their own devices to

* Kenneth F. McLaughlin, *Interpretation of Test Results*, U.S. Office of Education, Department of Health, Education and Welfare, U.S. Government Printing Office, Washington, 1964, pp. 49, 14.

explain these differences and make scores more meaningful. For instance, Beaverton Schools adopted the technique of marking each profile reporting card with the school average for each grade and test. This helped parents, students, teachers and counselors to compare the student to his peers, rather than a mythical average. We did this with a small frame, plastic cutouts, a fistful of red ballpoints and student help. This was only partially satisfactory, and reaction varied widely with the perceptual set of each individual. There was a need for more realistic norming.

The more-or-less obvious answer was to develop local norms and scores and back these up with interpretive materials—information, audio-visuals and research. This, Metro set out to do.

The logistics of this project have been formidable. Metro Testing now involves 40 high schools and encompasses test selection; data processing; developing materials and schedules for purchasing, administering, scoring, norming, reporting and interpreting the tests; accounting; evaluation and revision; and, recently, coming full-circle to the selection of new tests.

For further background information I recommend the pamphlet *Developing Local Norms,* published under the direction of Mrs. Tucker and available from Portland School District No. 1, Multnomah County and Clackamas County Intermediate Education Districts.

In this pamphlet there is a description of the development of the Metro entity—a cooperative working relationship among more schools than one can customarily get to agree about anything.

Other things involved with the project which we can only mention now are the problems of reporting, adapting all the mechanics of processing to the machines available and on order, cutting costs, developing uniform procedures, and maintaining not only full Metro participation but adequate professional standards and a reasonable degree of harmony. The key reason for the progress made has been the effort invested by the personnel involved. (As an aside—any area contemplating such a project should make sure of the commitment of the people involved and be willing to grant or assign some time, or they might just as well forget it. A project of this sort will not "just happen." There is too much involved and there are too many steps to be taken.)

One of the first tasks was to assure confidentiality of information, and there was an immediate and clear understanding by all partici-

pating schools that it would be a breach of professional ethics for any school to publicize its standing in terms of school averages compared with metropolitan area averages. No attempt was to be made to compare schools or evaluate teachers, and as far as I know, there has never been a breach of these ethics.

We selected the tests then in use by most schools, but it was necessary to agree on forms and dates of testing, scoring and reporting, materials and procedures, and to make interpretative assistance available, so that each school was equipped to handle the data. We agreed on testing in the fall of grades 9 and 11 and on the use of standard scores rather than percentiles or grade levels. Raw scores were all fed into one data processing center—ours happened to be Service Bureau—for computation of means, deviations and standard errors, and production of standard scores, print-outs, profile cards and press labels.

The details are myriad and since the more important ones come up later with the development of the new battery I'll skip them here.

One separate item that began with the original ITED program deserves mention. Though it is barely started, it will undoubtedly be more important in the new battery—the use of scores as multiple correlation predictors for future educational success. The original formulae were under study by high school and college counselors, but this has been sidetracked in the bustle of developing and norming a new battery.

This was the beginning of the project. However, there were some problems. Our tests began to age, and not always gracefully. Material copyrighted in 1957 received less than acclaim from teachers in light of curriculum developments in recent years. There were some valid criticisms leveled at the tests on grounds that they were neither current nor appropriate to the curriculum. We had to choose a new battery or forget the whole thing. However, coming up with an achievement test battery is easier said than selected.

When we try to measure achievement, our obligation is to the people who have the most at stake—students, teachers and parents. They must be able to accept the results at face value, not have to do a lot of compensating for flaws in the test or statistical manipulations. Test questions need to be teacher-selected or teacher written to accurately and adequately cover the subject matter involved. They must present a wide-enough range of difficulty for the students

tested that scores will distinguish those who have learned from those who have not. The distribution of scores should be normal enough that we may have confidence in the interpretation we give to differences between scores. This confidence must be borne out by being able to make better predictions with the tests than without them.

Before a test battery could be developed for Metro use, several considerations had to be met: The selection process had to involve a broad and representative group of teachers; valid selection and/or construction procedures had to be observed; sampling and analysis had to indicate likelihood of success.

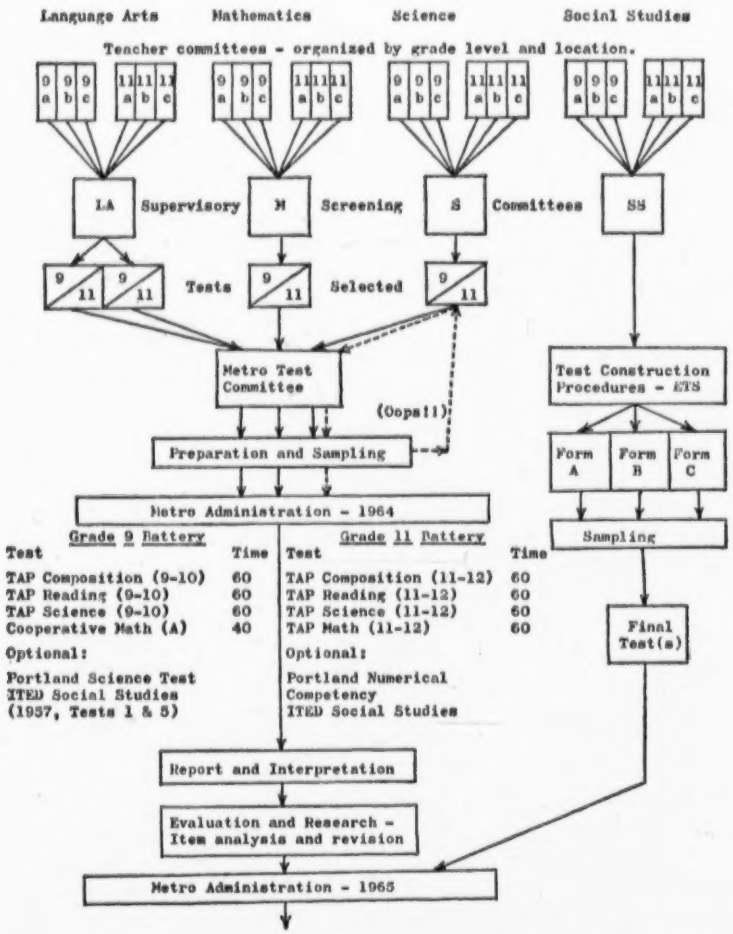
Perhaps we should again be a little surprised that 40 odd schools (and you can take that any way you want) should be able to agree on a selection procedure and carry it out without major incident. A chart plus a little descriptive material can probably best illustrate what was accomplished in the various subject matter areas.

Six teacher committees in each subject matter area were established, one each at the 9th and 11th grade levels in each of three locations in the Metro area. These committees analyzed each item of each available test on the basis of content validity, thought process required in the answer—remembering, understanding and/or thinking—appropriateness of material, level and construction.

The results were passed on to screening committees in each subject area. These screening committees were composed of teachers, department heads, supervisors and consultants. The recommendations of these committees varied widely. Language arts found appropriate tests for reading and composition at both levels, though their choices represented variations from the publisher's recommendations. Math selected a test for each level, conforming to one publisher's recommendations but not the other's. Science recommended tests for 9th and 11th grades of one publisher's sequence, but not at the level recommended by the publisher. Social studies could not find any tests which they felt were adequate for either level, and requested authority to construct their own, thereby committing themselves to an even more difficult task.

Shown in the chart is the difficulty which beset the first science choices. In the sampling process, these tests suffered an attack of statisticus erraticus and had to be retired in favor of close second choices, equal in content validity, but much better behaved. These are the tests which became part of the 1964 battery. (Basically, the science people selected tests well above publisher's recommenda-

METRO TEST SELECTION PROJECT



tions—difficult enough that the results just were not reliable.) Other Metro committees involved with all stages of the project include: steering, statistics, communication and interpretation.

Once the tests were selected, the sampling procedure was car-

ried out in the spring of 1964. Tests were allocated to Metro schools in a random distribution. Enough students were selected individually from the schools' rolls to give a 10 per cent sample. The tests were scored; means, deviations and standard errors were computed. (It was in this stage that the first science tests had to be replaced.) Incidentally we used three experimental test times in sampling and obtained a good deal of information on test-taking behavior, though we are really just beginning to study it.

It was also necessary to prepare administrative manuals and procedures, to develop a coding system for the entire Metro area which was compatible with the pupil accounting practices of member schools (some of whom use data processing systems—of various types—and some who do not.) New cards, labels and materials had to be prepared for reporting and interpretation. Reporting materials were standard for the Metro area, but each school district handled its own interpretive information program, though these were influenced by Metro representatives.

Following the fall administration and scoring, distributions, means, deviations and standard scores were prepared. The whole process really went very smoothly, though certainly not without hitches. (During this year we re-learned—among other things—that a slight increase in the complexity of answer sheet directions for teachers and students can result in a substantially higher rate of error in marking, and this slowed reporting.)

There are several things in progress now which we hope will be accomplished before next year in addition to the completion of the social studies test. We are developing more refined reporting and interpreting procedures and looking for ways to make answer sheets more nearly foolproof—we hope they will be pre-identified before this fall. Standard error calculation and item analysis are in process. Our goal, of course, is to be able to cut test time without losing range and discrimination. We are almost certain we can close the time gap between testing and reporting. We are also recommending a change in the structure of the Metro group this year to ask each district to assign a Metro representative who will be allotted time for Metro participation, and who can officially speak for his district on most matters.

Now let's return to our social scientists. There are quite a few steps involved when a group commits itself to the development of a new test and these are shown in the following:

STEPS IN THE DEVELOPMENT OF THE
SOCIAL STUDIES SKILLS TEST

1. Social Studies Screening Committee request to construct—not select—a test for the new Metro battery.
2. Administrative meeting to establish participation in Clackamas, Multnomah and Washington Counties and Portland.
3. Meeting with ETS representatives Dana Kurfmann and Fred DeBruler.
4. Appointment of a four-member (one from each area) committee to formulate test specifications.
5. Distribution of preliminary specifications to all school districts for comment and revision.
6. Preparation of final specifications.
7. Formation of representative teacher committees.
8. Item-writing workshop conducted by ETS. (This workshop produced approximately half of the items in the three experimental forms; the remainder were selected from ETS item files.)
9. Establishing elementary and secondary curriculum to be covered, objectives and means of achievement.
10. Establishing standards of construction, content, materials, etc.
11. Item construction and selection from files.
12. Critique and revisions by all participating districts.
13. First drafts of three equivalent forms.
14. Refinement and revision by ETS consultants.
15. Final evaluation and approval of writing committees. (This step performed on the coded experimental drafts of the three forms.)
16. Printing of experimental forms A, B, C.
17. Sampling and administration to 21 per cent sample (7 per cent form)—spring, 1965.
18. Item analysis—difficulty and discrimination.
19. Development of final form(s) for Metro battery.
20. First inclusion and mass standardization—fall, 1965.
21. Refinement and revision with other portions of the battery prior to 1966 administration.

You will note from the title that this is to be a skills test. There are many tests on the market which measure subject matter of various types and this is where the social scientists disagreed. Once they had decided to build a test of their own, it was much easier to reach agreement on the content or coverage of skills test, even though such a test is more difficult to construct.

They had to deviate from the format of most published tests and did so by setting their own goals and preparing an outline of the

materials and skills they wished to include. The final specifications agreed upon are shown below, and this balance will be maintained through experimental and final forms.

PORTLAND-TRI-COUNTY SOCIAL STUDIES
SKILLS TEST OUTLINE
Revision of August 26, 1964

Percentage of test	
30	1. Using and Reading Printed Materials
	1. Recognizing the function of a table of contents, a preface, a glossary, an index, and an appendix.
	2. Obtaining information from a library card catalogue.
	3. Recognizing the types of information obtainable from such standard references as encyclopedias and dictionaries.
	4. Recognizing major and subordinate ideas.
	5. Making inferences.
20	2. Using Maps and Globes
	1. Understanding map projections in relation to a globe.
	2. Locating places in terms of latitude and longitude.
	3. Estimating distances.
	4. Understanding time zones, date lines, and Great Circle Routes.
	5. Locating natural and man-made objects on a map.
	6. Determining directions on a map.
	7. Interpreting the map legend.
	8. Relating information from different types of maps.
	9. Making inferences.
15	3. Using Graphic and Pictorial Materials
	1. Obtaining information.
	2. Making inferences.
35	4. Critical Thinking
	1. Identifying a problem or an issue.
	2. Determining the relevance of ideas and information with respect to a problem.
	3. Recognizing information needed in the solution of a problem.
	4. Evaluating the reliability of evidence.
	5. Distinguishing matters of fact, definition, and value.
	6. Recognizing assumptions.
100%	

Many of the graphs, maps, etc., used in the first forms prepared for critique were relatively rough. Questions were coded with item numbers plus two digits which represented the section and subsec-

tion of the specifications which the item was to test—and a letter which showed the correct answer. These were for study purposes and do not appear on the tests as the student sees them. If an item must be replaced, it may be replaced by one measuring the same skill. If the three forms must be condensed into two—or even one, the balance shown in No. 3 may be maintained.

In sampling these three forms this spring, we are relying on a seven per cent sample for each form. The sample has been arranged through a random selection of 8th grade classrooms in the four areas, and each will then be processed in a fashion similar to the results of the initial selections last spring, except that they must also be immediately subjected to item-analysis and selection. A final test—or tests—if there are enough good items—must be prepared—we hope in time to use this fall.

We cannot deal with all the details here, but there are a few we should mention for the benefit of anyone else who considers developing local tests to put more meaning into this program. It is important to deal with publishers who will negotiate any or all parts of their testing programs. (If a publisher insists on a package deal it will be pretty costly.) It is also important for the publisher to be willing to cooperate in the development of new tests which will meet area curriculum requirements—as ETS has done with us—and which will behave well statistically so that there can be value in the results. It is necessary to have adequate data processing facilities available at reasonable cost.

The more valid the tests are locally, the more uses the individual teacher or counselor has for the results. For instance, ETS puts out two pamphlets titled: "Interpreting Test Scores Realistically" and "Using Test Results," which the counselor or teacher can use to interpret and predict on his own. Basic procedures are presented so that the teacher can use scattergrams and the like within his own classes, and this can help the teacher become more familiar with the tests, rather than making him suspicious of the statisticians. When the teacher and students are "involved" comparative, standardized tests are part of the learning process. Unless they are, there can be questions raised about using them at all.

This, in capsule form, is Metro Testing. It has helped us in developing solutions to our problems, has added to our confidence in our test results, and to our teachers' knowledge and use of the information we can provide. . . . It seems to work.

■ CHAIRMAN RELLER: Thank you, Mr. Keezel for a very comprehensive review.

We will turn now to our final presentation, this one dealing with "New Directions in Assessing Achievement." To make this presentation we have one who has had junior high school teaching experience, who has served on college and university teaching staffs at New York University and Rutgers University and who joined the Test Development Division of Educational Testing Service somewhat more than ten years ago. He became Assistant Director of Test Development, then Director, and in 1963, Vice President. It gives me a great deal of pleasure to present Mr. Solomon.

MR. SOLOMON: Thank you, Dean Reller. It strikes me that this Conference on Testing has yet to hear a joke about testing, so with your permission let me try. It's a story of a poor soul who some of us would describe as a pawn of fate, a child of misfortune. At any rate, wherever he went, whatever he did, things never went well. If he bit into an apple, the apple had a worm. If he put his spoon into a grapefruit, he was squirted in the eye. If he walked down the street, a car came by and splashed him with mud.

Well, one fine day this poor soul had to take a trip to San Francisco and as you might expect he missed his plane and because he had to be at this important meeting he arranged for a chartered plane. The plane took off and, of course, once more, no sooner were they airborne than all the motors went dead. In panic, the pilot pushed a parachute into his arms and said, "Put it on and jump." And our poor soul put it on and jumped. And you know what happened. He pulled the ripcord and nothing happened. At this point as he was falling to earth about to meet his doom in desperation he turned to prayer and said, "St. Francis, St. Francis, save me. Save me and I'll devote the rest of my life to you." And at this point, a mighty arm came out from behind a cloud, grabbed him in mid-air and held him. Then a magisterial voice said, "St. Francis Xavier or St. Francis of Assisi?" And our poor soul thought a minute and then said, "St. Francis Xavier." And the hand opened and he dropped.

The moral to the story is it never pays to guess on two choice items, especially when there is a correction for guessing.

New Directions in Assessing Achievement

ROBERT J. SOLOMON

Testing is an old profession. Along with gunpowder, kites, and printing, testing appears to have been invented by the Chinese. But it has been the pragmatic Americans who have raised the art of testing to its present level of sophistication. Along with atomic energy, airplanes, and public libraries, testing may well be listed by future historians among the unique developments of American society. If so, it will reflect a recognition of the American belief in education. For it is because of our conviction that progress rests on the identification and nurture of individual talent that we have developed instruments that work to identify, guide, and assess individual potential and achievement. Combine a belief in individual achievement, social progress, and pragmatic solutions and you have an explanation of why a Chinese invention has become an American institution.

The close relationship between education and testing is perhaps best seen in the measurement of educational achievement. When achievement tests are constructed properly, they measure what educators believe are the more important outcomes of instruction, and their use, content, and interpretation are closely related to the educational process.

The past twenty years have seen a significant improvement in the educational relevance of achievement tests. In part, this has been a result of recognition that the construction of better achievement tests depends on better defined statements of educational objectives and, in turn, of the efforts that have been made to show how this could be done—to the benefit of teaching as well as testing. An outstanding example of these efforts is the *Taxonomy of Educational Objectives,* edited by Benjamin Bloom. In part, too, the improvement in the educational validity of achievement tests has been a result of the efforts made to involve teachers and scholars in the actual planning and development of achievement tests. For example, for each achievement test ETS develops in a subject field, there is a panel of specialists in the field who plan, write, review, and

approve the test before it is used. In a typical year, about 600 such individuals participate in developing tests at ETS.

Still another force for the improvement of achievement tests has been the efforts made to improve the ways of measuring achievement. A little over a year ago ETS published a booklet entitled *Multiple-Choice Questions: A Close Look*. Perhaps many of you have seen it; if not, it is available from ETS without cost. As the introduction to the booklet states, "The purpose of this close look at a group of multiple-choice questions is to dispel a myth: the myth of the multiple-choice question as a superficial exercise. . . . Like other myths, this one may be based on a shadowy memory of the past, but it bears little relation to present reality." Although in the past, achievement tests—multiple-choice and essay—often tended to measure little more than factual recall, and although too frequently a few still do, there is now ample demonstration that this need not be. There are volumes of literature—of which *Multiple-Choice Questions: A Close Look* is merely one—that show how the construction of achievement tests can be consistent with and supporting of important educational objectives.

Recently, there have been several developments that show how the art of achievement testing continues to move in the direction of the construction of tests that are educationally valid. Some have been made possible by new technology that was not widely available until a few years ago. Some are old wines in new bottles, but in at least one case the new, improved bottle is the result of research studies started more than a decade ago. Still others are little more than a gleam in the collective eye of those who contemplate the future of achievement testing.

One development or, more correctly, one series of developments has to do with the need to develop tests that sample as directly as possible the behavior that is the criterion of educational achievement. To obtain reliable measurement and, ultimately, valid measurement as well, tests sometimes need to be structured in ways that seem artificial in terms of the criterion behavior to be measured. Usually the artificial-appearing test produces valid and useful results, but the ideal is a test that validly measures the criterion behavior because it *is* a sample of criterion behavior—or a very reasonable facsimile thereof.

A recent development that reflects this concern has been the introduction of the tab-question technique in the tests of the National

Board of Medical Examiners. The tab technique is useful when one is concerned with sequential thinking of a diagnostic problem-solving type. It provides a measure of behavior that involves the serial performance of a set of procedures, where the performance of one step yields information that supplies a cue for the selection of the next and subsequent steps. The name comes from the fact that the examinee pulls a tab each time he answers a question. The examinee proceeds from one question to the next on the basis of the information he finds under each tab. The National Board of Medical Examiners uses the tab technique to simulate the procedures a doctor would follow in diagnosing and treating an illness. To my knowledge the technique was first used by Robert Glaser and the late Dora Damrin to assess the performance of radar mechanics. As in golf, the best score is the lowest score: the fewer tabs lifted, the better the examinee's problem-solving proficiency.

Another feature of the tab technique is that it has the potential for teaching as well as testing by providing immediate feedback to the student on the correctness or incorrectness of his response and by giving him the reasons for the correct response and explaining why other responses are incorrect. In this respect the tab test is related to many similar developments in the past forty years in testing and, more recently, in programmed instruction.

Another recent development that represents the effort to develop tests that measure behavior as directly as possible is also an example of how tests need to change as the curriculum changes. In this case, the development has been prompted by a fundamental shift in the objectives of teaching modern languages. Although the audio-lingual method is not new, the present emphasis given to it in the teaching of modern languages represents a major curriculum reform.

If tests are to be educationally valid, a change in instructional objectives requires a change in tests of instructional outcomes. In this instance, a new type of test has been developed. It is a test of foreign-language speaking ability in which the student speaking into a tape recorder pronounces words, reads a passage aloud, describes a series of pictures, or tells a story. The student's tape is then graded by trained scorers using scoring standards in much the same way that trained readers grade essay tests. One remarkable characteristic of these speaking tests is that although they are essentially free-response tests and therefore susceptible to all the defects of such instruments, they can be scored with remarkable reliability.

Relatively short tests of about twenty minute duration consistently yield estimates of test reliability above .8 and frequently as high as .9. These speaking tests, which as a result of projects sponsored by the Modern Language Association and supported by the U.S. Office of Education are now available in French, Spanish, Russian, German, and Italian, to test both aspiring teachers and students from grade 7 through college, would probably not have been possible a generation ago before the advent of language laboratories and mass-produced, low-cost tape recording equipment.

If the development of speaking tests represents a relatively new curricular objective, another recent development represents an objective as old as the American school itself. This concerns the ability to write. Although we know how to construct multiple-choice tests that are extremely effective in measuring students' writing ability, as determined by grades in English and teachers' ratings, we continue to seek ways to reliably and validly measure writing ability by having students write. In the course of this search, improved techniques for constructing and grading essay tests have been developed, and a considerable body of research knowledge about the essay test has been accumulated. Now, as a result of the most recent research in this area, the College Board English Composition Test combines multiple-choice and essay questions in a test of students' ability to write with no less the reliability or validity of earlier exclusively multiple-choice tests. Although no single element in this approach is new, the complementary balancing of multiple-choice and essay questions and the method used for grading the essays (which relies on several global judgments instead of a single analytical judgment) represent an important step toward resolving the persistent problem, particularly in English composition, of measuring criterion behavior in a reliable, valid, and relatively direct way.

However, ultimate success in the improvement of tests to measure the important behavioral outcomes of instruction will require another type of development that is only now beginning. Speaking tests in French and writing tests in English are relatively obvious solutions to the measurement of criterion behavior. But if we shift to a subject such as biology, how then should we revise our tests to measure better the behavior that is the criterion of achievement in biology? What is such behavior? What do we expect the student of biology to be able to do—and how do we know if he can do it? One solution is to do what specialists in the development of achieve-

ment tests now do. That is, an expert committee of teachers and scholars specify the desired outcomes of instruction and then write questions that in their judgment measure these outcomes. The evidence that they have succeeded is their own judgment and that of their peers that they have done so, or the relationship between test scores and grades in the subject. Although this approach has been generally successful, its limitation is that the measurement of the criterion behavior is inferential. Another approach that we are now attempting in connection with the College Board Biology Achievement Test is the production of the criterion behavior itself. This will involve the definition in behavioral terms of all the important outcomes of high school biology and the subsequent definition and development of situations in which the behavior may be manifested. These situations will include activities of all kinds—in school and out of school, in the laboratory and in the field. If the project is successful, it will provide a means for gathering direct evidence on the achievement of each important objective of high school biology and for relating such evidence to the construction of paper-and-pencil achievement tests. Although the number of activities in the criterion measure would probably require weeks for any one student to complete, on a sampling basis it should be possible to determine which of the important outcomes of biology instruction are now being measured by the College Board Biology Achievement Test and which, if any, are not.

The educational relevance of achievement testing has many aspects. There is, for example, the problem of assessing those objectives of instruction that are concerned with *how* students think rather than *what* they think or know. In his recent research on the outcomes of instruction in the new high school physics course developed by the Physical Science Study Committee, Robert Heath developed a cognitive preference test that measures not whether the student can solve each of the problems presented—all responses are correct—but rather what type of answer he prefers. Each response offers a different way of considering the problem. Is the student predisposed to consider the problem in terms of its theoretical or its practical implications? Does he prefer to think first of the principles involved or would he rather think first of related facts? Heath found that different physics curricula produced different cognitive preferences. For curriculum evaluation particularly, the cognitive preference test offers a new way to relate achievement testing to the objectives of instruction.

Not all improvements in the validity of achievement tests require the development of new kinds of tests. One persistent problem that faces a school system that builds its curriculum with thought and care, and that selects with equal thought and care the standardized achievement tests it uses, is that certain curricular objectives unique to that school system may be neglected or overlooked entirely in standardized tests. If so, the tests are less than ideal instruments for curricular or student evaluation. Faced by this dilemma the school may decide to use no standardized test at all—which it often cannot do easily—or to use the one that comes closest to measuring those objectives that it considers most important. Recently, however, the Portland (Oregon) public schools finding themselves in this predicament proposed to ETS a novel solution. They asked ETS to help them build the kind of social studies test they wanted and to do so by adapting an existing social studies test. The project was begun last summer. With the assistance of a test development consultant from ETS, a team of social studies teachers from Portland reviewed their social studies objectives for junior high schools and developed content specifications for the tests they need. Then, analyzing ETS-published tests and a pool of additional test questions from ETS, the Portland teachers identified those objectives for which test questions existed and those for which new test questions were needed. They decided that about 60 per cent of the questions could come from the ETS pool and about 40 per cent would have to be written at that time. Since then, the new questions have been written and pretested. Within the next few months, the new Portland social studies tests will be assembled. Although Portland probably could have carried forward the entire project successfully without ETS's assistance and its pool of questions, we believe that the project was made easier by having been done in the manner just described.

The Portland project has interesting implications. First, it suggests the beginnings of a new approach to standardized achievement tests. For years we have been telling schools that they should select achievement tests that are consistent with their instructional objectives. In the future, any school that finds existing tests inadequate or inappropriate may be able to build its own. But, if every school developed its own test, it would have no way of comparing itself to others, or its students to a national norm. We may therefore see the development of modular tests that would enable a school system to use modules that would be appropriate for it and many other

schools in combination with other modules that would be unique to that school.

Further, if one also considers the demonstrated capabilities of computers, it is possible to foresee a time in the near future when an organization such as ETS could quickly and cheaply assemble tests to meet a school's specifications and to do so from a pool of test questions stored in its computer and classified by content, difficulty, etc. And as new questions were written and as new data were gathered with each question's use, the pool would become more comprehensive and more useful. Also, computers could make possible the rapid and inexpensive computation of local norms and equivalent national norms for these custom tailored, computer-assembled tests.

Looking beyond these tests that are computer-assembled and custom tailored for each school, the standardized achievement test of the future may be custom tailored for each student. Administered by means of computer equipment that would select for each student the next question he should try, depending on his responses to previous questions, the test would permit each student to move forward at his own speed and to branch in different directions as his ability and knowledge permitted. The information provided by such tests would make possible a genuinely individualized assessment and diagnosis of each student's achievement.

I began by saying that testing is an old profession. I hope that I have shown that it is not a static one. Tests on tabs, tape recorders, and computers do suggest that the technology of achievement testing is changing. But the more important changes are those that improve our understanding of individual achievement and consequently our ability thereby to improve the education of the individual.

Closing Remarks

■ CHAIRMAN RELLER: As I have listened to the presentations today and thought of the problem of documenting educational change, an area to which we have devoted relatively little thought, it seems to me that it is the whole matter of related staff development in connection with the problems of testing and evaluation which is important. In his concluding statement Mr. Solomon pointed to the possibility of individual assessment. It and many of these suggested developments call for attention to the question of staff development. I think it is a very central problem with which all of us must be very much concerned.

In concluding I might relate just a final story and in order that Mr. Solomon will not say that it is not related to the subject at hand, may I suggest that it does pertain to norms? The story is one of the many about that great Englishman of our time, Winston Churchill. He was being presented in Albert Hall in London before a very large meeting of women. He was being introduced to representatives of the Women's Clubs and by a woman who had long been interested in the temperance movement. In the course of her presentation she pointed to the fact that not only had he played a very significant part in the life of England but certainly also of the whole Western world and even beyond and would stand as one of the great leaders of men.

But with her particular background she found it difficult not to make some reference to some of his other achievements and so she referred to the fact that he not only had made these remarkable achievements, these great contributions to the human race but that while in the process of doing it had actually consumed great quantities of brandy. And as she looked over the vast hall she said that it had been estimated that actually the brandy he had consumed would fill Albert Hall to at least a fifteen-foot level. When Churchill arose he looked at this point in the distance and slowly turned his head to survey the great hall. "Yes," he said, "I regret that the norms in our society have not permitted adequate recognition of individual differences. There is, as a result, still so much to do and so short a time in which to do it."

May I just in closing express my thanks to all of you, those who were involved in the various roles of this Conference. Thank you very much.

Conference List • 1965

John D. Adams, Jr., *Counselor,* Burlingame High School, Burlingame, California

Daniel S. Alcala, *Foreign Language Consultant,* San Mateo City Schools, San Mateo, California

Deryle K. Allen, *Test Officer,* Fresno State College, Fresno, California

Nicholas Anastastow, *Director of Research,* Palo Alto School District, Palo Alto, California

J. Douglas Ayers, *Associate Professor,* Department of Educational Psychology, University of Alberta, Edmonton, Alberta

Alden W. Badal, *Assistant in Research,* Oakland Public Schools, Oakland, California

Clarence H. Bagley, *Coordinator,* Office of Institutional Research, Washington State University, Pullman, Washington

C. S. Banwarth, *Chairman,* Mathematics Department, College of San Mateo, San Mateo, California

Justin M. Bardellini, *Consultant in Instruction,* Mt. Diablo Unified School District, Concord, California

Denis Baron, *Professor of Education,* Oregon State University, Corvallis, Oregon

Newton K. Chase, *Consultant,* State Board of Education, California State Department of Education, Sacramento, California

Jerome J. Beamish, *Associate Dean of Student Affairs,* Stanislaus State College, Turlock, California

Paul E. Bender, *Director of General Services,* Western Office, Educational Testing Service, Berkeley, California

Wesley J. Berg, *Senior Education Specialist,* I.B.M., San Jose, California

Wayne Boone, *Vice Principal,* San Rafael High School, San Rafael, California

Dick H. Bower, *Research Assistant,* School Planning Laboratory, Stanford University, Stanford, California

Edward W. Bowes, Jr., *Coordinator of Statistical Studies,* University of California, Berkeley, California

Donald Boysen, *Director of Guidance,* Saratoga High School-Los Gatos Joint Union High School District, Saratoga, California

James Brehler, *Vice Principal,* Tahoe-Truckee High School, Truckee, California

David J. Brinks, *Coordinator of Testing,* University of Oregon, Eugene, Oregon

W. Shelburne Brown, *President,* Pasadena College, Pasadena, California

Guy H. Browning, *Associate Director,* Counseling and Testing Center, Stanford University, Stanford, California

Katherine Brownlie, *Director of Personnel,* Western Office, Educational Testing Service, Berkeley, California

Harold W. Burk, *Chairman,* Psychology Department, University of Puget Sound, Tacoma, Washington

Leonard Burt, *Vice Principal,* Instruction, Pleasant Hill High School, Pleasant Hill, California

Leonard S. Cahen, *Project Coordinator,* Stanford University—NLSMA, Stanford, California

Stanley N. Califf, *Assistant Professor of Psychology,* Chapman College, Orange, California

William Callison, *Director of Admissions,* Occidental College, Los Angeles, California

Robert G. Cameron, *Director,* Western Regional Office, College Entrance Examination Board, Palo Alto, California

Douglass Campbell, *Curriculum Consultant,* Santa Rosa High School District, Santa Rosa, Californiia

Fred Canrinus, *Principal,* Los Gatos High School, Los Gatos, California

Lucille Carson, *Educational Counselor,* George Washington High School, San Francisco, California

William Cass, *Director,* Student Counseling Center, Washington State University, Pullman, Washington

Frank W. Cooper, *Curriculum Assistant,* Ygnacio Valley High School, Concord, California

Walter F. Crowley, *Assistant Superintendent,* Madera School District, Madera, California

Robert J. Darling, *Area Director,* California Test Bureau, Salinas, California

John N. Davis, *Supervisor of Mathematics and Science,* San Jose Unified School District, San Jose, California

Fred M. DeBruler, *Northwestern Regional Representative,* Educational Testing Service, Seattle, Washington

Ralph DeBruler, *Coordinator,* Research and Testing, Edmonds School District #15, Lynnwood, Washington

Marvin N. Dillon, *Dean,* Counseling and Testing, Sonoma State College, Rohnert Park, California

Marjorie Dole, *Counselor,* California State College, Long Beach, California

Laura M. Doyle, *Counselor,* Menlo-Atherton High School, Atherton, California

Harold W. Drummond, *Principal,* Tahoe-Truckee High School, Truckee, California

Sidney I. Duddy, *Mathematics Supervisor,* Tamalpais Union High School District, Larkspur, California

Robert D. Duke, *Counselor-Test Officer,* Sonoma State College, Rohnert Park, California

Arnold J. Edman, *Dean of Counseling,* West Valley College, Campbell, California

Russell W. Edwards, *Dean of Students,* Monterey Institute of Foreign Studies, Monterey, California

Merle H. Elliott, *Director of Research,* Oakland Unified School District, Oakland, California

Ralph F. Evans, *Professor of Education,* Fresno State College, Fresno, California

Ann E. Ferris, *Secretary,* Advisory Services, Western Office, Educational Testing Service, Berkeley, California

Edgar H. Fickenscher, *Administrative Assistant,* Fremont Union High School District, Sunnyvale, California

Richard G. Finch, *Spanish,* Cubberley High School, Palo Alto, California

Richard O. Fortna, *Professional Associate,* Advisory Services, Western Office, Educational Testing Service, Berkeley, California

Jerry C. Garlock, *Consultant,* Research and Guidance, Los Angeles County Schools Office, Los Angeles, California

Walter R. Gaston, *Test Counselor,* San Bernardino City Unified School District, San Bernardino, California

Jane W. Geeting, *Assistant to the Director,* College Entrance Examination Board, Western Regional Office, Palo Alto, California

Nancy C. Gilmer, *Administrative Assistant,* The Anna Head School, Oakland, California

John L. Glaese, *Superintendent,* Sonoma Valley Unified School District, Sonoma, California

Willis C. Goins, *Administrative Assistant,* Mt. Diablo Unified School District, Concord, California

Garford G. Gordon, *Research Executive,* California Teachers' Association, Burlingame, California

Frank F. Gorow, *Professor,* Secondary Education, California State College at Long Beach, Long Beach, California

David Gutierrez, *Psychometrist,* Folsom Joint Unified School District, Folsom, California

Joyce Hardy, *Curriculum Assistant,* Mt. Diablo High School, Concord, California

Lucille Harris, *Supervisor,* Research and Testing, Orange County Schools, Santa Ana, California

J. Richard Harsh, *Southern California Representative,* Educational Testing Service, Los Angeles, California

Ransom Hawley, Jr., *Coordinator of Foreign Languages,* San Jose Unified School District, San Jose, California

Einar Haugen, *Guidance Director,* Golden Gate Academy, Oakland, California

Robert W. Heath, *Director of Research,* Western Office, Educational Testing Service, Berkeley, California

Thomas F. Humiston, *Counselor,* City College of San Francisco, San Francisco, California

Paul DeHart Hurd, *Professor of Education,* Stanford University, Stanford, California

William M. Hutchinson, *Assistant Principal–Guidance,* Cubberley High School, Palo Alto, California

David R. Janssen, *Research Associate,* Western Office, Educational Testing Service, Berkeley, California

Richard B. Jenkins, *Assistant Principal,* Pupil Personnel Services, Victor Valley Senior High School, Victorville, California

Charles L. Jenks, *Guidance Consultant,* Marin County Schools, San Rafael, California

Mrs. Iva Jex, *Manager,* School Testing Service, Berkeley, California

Bert B. Johnson, *Curriculum Assistant,* College Park High School, Pleasant Hill, California

Robert A. Jones, *Head,* Test Bureau, University of Southern California, Los Angeles, California

Richard W. Jonsen, *Associate Director of Admissions,* University of Santa Clara, Santa Clara, California

David Kagan, *Assistant Director,* Relations with Schools, University of California, Los Angeles, California

Phyllis E. Kennedy, *Testing Supervisor,* San Fernando Valley State College, Northridge, California

David P. Kressen, *Assistant Headmaster,* Polytechnic School, Pasadena, California

Nadine M. Lambert, *Assistant Professor,* School of Education, University of California, Berkeley, California

Robert E. Lambert, *Director,* Advisory Services, Western Office, Educational Testing Service, Berkeley, California

Vernon F. Larsen, *Staff Associate,* Science Research Associates, Oakland, California

Curtis Larson, *Counselor,* San Mateo High School, San Mateo, California

Norma C. Lavelle, *Coordinator,* Foreign Languages, Mt. Diablo Unified School District, Concord, California

Alexander I. Law, *Professional Associate,* Advisory Services, Western Office, Educational Testing Service, Berkeley, California

James D. Leake, *Director of Guidance,* Counseling and Evaluation, Denver Public Schools, Denver, Colorado

Deloris Leander, *Head,* Cooperative Test Division, Western Office, Educational Testing Service, Berkeley, California

Leonard R. Levine, *Coordinator,* Special Education, South San Francisco Unified School District, South San Francisco, California

Richard S. Levine, *Director,* Western Office, Educational Testing Service, Berkeley, California

John H. Lewis, *Guidance,* Cubberley High School, Palo Alto, California

Orral S. Luke, *Director,* Guidance and Testing, Bakersfield College, Bakersfield, California

Miles McColm, *Foreign Language Supervisor,* Tamalpais Union High School District, Larkspur, California

Benjamin W. McKendall, Jr., *Assistant Director,* Western Office, College Entrance Examination Board, Palo Alto, California

Tallulah E. Maki, *Psychologist,* Counseling Center, University of California, Riverside, California

F. Grant Marsh, *Coordinator,* Testing Services, San Francisco State College, San Francisco, California

Maurine V. Marsh, *Foreign Languages,* College of San Mateo, San Mateo, California

Robert Mathewson, S.J., *Counselor,* St. Ignatius High School, San Francisco, California

Herbert G. May, *Assistant Principal,* Santa Fe High School, Santa Fe Springs, California

Harold E. Miller, *Director,* Teacher Training, Westmont College, Santa Barbara, California

Bruse Moncreiff, *Planner,* Advisory Systems, I.B.M. Instructional Systems Development Division, Los Gatos, California

William A. Moser, *Registrar,* Menlo College, Menlo Park, California

Don Murfin, *Assistant Principal,* Curriculum, South High School, Bakersfield, California

Oberlin B. Nereson, *Test Officer,* Foothill College, Los Altos Hills, California

Thomas Nesbitt, *Director of Testing,* Research and Guidance, City College of San Francisco, San Francisco, California

M. James Norton, *Head Counselor,* San Rafael High School, San Rafael, California

Mary H. Owen, *Coordinator for Publications and Mailings,* Western Office, Educational Testing Service, Berkeley, California

Morris J. Padia, *Assistant Principal,* Whittier High School, Whittier, California

Holland I. Payne, *Program Specialist—Mathematics,* Sacramento City Unified School District, Sacramento, California

DeGroff Platte, *Coordinator of Curriculum,* San Mateo Union High School District, San Mateo, California

Paul E. Plummer, *Principal,* Golden Gate Academy, Oakland, California
George V. Porter, Jr., *Chief,* Examinations Division, United States Air Force Academy, U.S.A.F. Academy, Colorado
LeRoy E. Porter, *Coordinator,* Testing, Research and Guidance, Redwood City School District, Redwood City, California
Helen L. Prouty, *Professor of Education,* San Diego State College, San Diego, California
Mrs. Mabel C. Purl, *Director of Research and Testing,* Riverside Unified Schools, Riverside, California
Gloria Pyszka, *Assistant to the Director of Admissions,* Mills College, Oakland, California
Joseph P. Rice, *Consultant in Education of the Gifted,* State Department of Education, Division of Special Schools and Services, Sacramento, California
William V. Rickel, *Coordinator of Testing,* Anaheim Union High School District, Anaheim, California
Alvin E. Robinson, *Assistant Superintendent,* Oxnard School District, Oxnard, California
Charles R. Rothaermel, *Assistant Principal,* Guidance, California High School, Whittier, California
Mary Budd Rowe, *Lecturer in Education,* School of Education, Stanford University, Stanford, California
Dorothy Roy, *Executive Secretary,* Western Office, Educational Testing Service, Berkeley, California
Juan F. Salinda, *Staff Psychometrist,* Loyola University of Los Angeles, Los Angeles, California
Kimball Salmon, *Assistant to the Deputy,* Special Services, Sacramento City Unified School District, Sacramento, California
Louis Schmidt, *Chairman,* Psychology Department, California State College, Fullerton, California
Emil J. Schnier, *Counselor,* Valley College, San Bernardino, California
Wade Schroeder, *Coordinator,* Guidance and Research, Campbell Union High School District, Campbell, California
Jim R. Schunert, *Professor of Education,* San Diego State College, San Diego, California
Dwight T. Shafer, *Associate Professor of Education,* San Jose State College, San Jose, California
Mrs. Catherine Sheehan, *Counselor and Testing Supervisor,* George Washington High School, San Francisco, California
Tom Shellhammer, *Consultant,* Education Research, California State Department of Education, Sacramento, California
Ralph P. Sherlock, *Assistant Superintendent,* Merced Union High School District, Merced, California

Arthur W. Sherman, Jr., *Professor of Psychology,* Sacramento State College, Sacramento, California

Herbert S. Singer, *School Psychologist,* Berkeley Unified School District, Berkeley, California

Sister M. George, *Superintendent,* Dominican Upper School, San Rafael, California

Sister Mary Geneva, *C.P.P.S.,* St. Mary's High School, Phoenix, Arizona

Sister Mary Hilary, *C.P.P.S.,* St. Mary's High School, Phoenix, Arizona

Sister Mary Margaret, *Vice Principal,* Providence High School, Burbank, California

Sister Mary Maurice, O.P., *Principal,* Dominican Upper School, San Rafael, California

Sister Rebecca, *Principal,* Providence High School, Burbank, California

Anthony Smykal, Jr., *Chief Counselor,* Modesto Junior College, Modesto, California

Mrs. Dorothy Soeberg, *Assistant Professor of Education,* California State College, Los Angeles, California

Paul J. Sorrentino, *Program Specialist,* Foreign Languages, Sacramento City Unified School District, Sacramento, California

E. Laurence Springer, *School Consultant,* La Jolla, California

H. W. Staffelbach, *Curriculum Coordinator,* Martinez Unified School District, Martinez, California

Curt Stafford, *Test Officer,* San Jose State College, San Jose, California

Vivian Stallkamp, *General Education Supervisor,* Campbell Union High School District, Campbell, California

Lealand D. Stier, *Director of Instructional Services,* Saratoga Union School District, Saratoga, California

Jerome Storm, *Associate Professor of Education,* Pacific University, Forest Grove, Oregon

Edward A. Taylor, *Coordinator of Evaluation,* Alameda County School Department, Hayward, California

John Barrett Taylor, *Counselor,* California College of Arts and Crafts, Oakland, California

Scott D. Thomson, *Principal,* Cubberley High School, Palo Alto, California

Paul A. Thornburgh, *Psychometrist,* California State Polytechnic College, Pomona, California

Mrs. B. D. Thorsen, *Administrative Assistant,* Katherine Delmar Burke School, San Francisco, California

Edward Tonningsen, *Coordinator of Pupil Personnel Services,* Mt. Diablo Unified School District, Concord, California

Joseph D. Tranchina, *Assistant Principal,* Mission San Jose High School, Fremont, California

Arthur L. Traphagen, *Coordinator of Guidance*, San Mateo Union High School District, San Mateo, California
Vernon E. Trimble, *Principal*, Saratoga High School, Saratoga, California
George M. Truscott, *Head*, Mathematics Department, Cubberley High School, Palo Alto, California
Frederick T. Tyler, *Professor of Education*, University of California, Berkeley, California
Elizabeth L. Van Dalesm, *Director*, Guidance and Research, Sequoia District, Redwood City, California
Walter J. Vassar, *Dean of Boys*, San Leandro High School, San Leandro, California
Harvey R. Wall, *Coordinator*, Advanced Programs, Mt. Diablo Unified School District, Concord, California
Norman B. Watkins, *Area Manager*, Science Research Associates, Centerville, Utah
Robert Wendorf, *Director of Guidance*, Acalanes High School District, Lafayette, California
Floyd E. Williams, *Vice Principal*, San Leandro High School, San Leandro, California
Margaret C. Williams, *Director of Guidance*, Yreka Union High School District, Yreka, California
Nathalie Wollin, *Directress*, Hillbrook Schools, Los Gatos, California
Robert G. Wolstoncroft, *Assistant Principal*, Guidance, Sierra High School, Whittier, California
William Yabroff, *NDEA Research*, Palo Alto Unified Schools, Palo Alto, California
Leil L. Young, *Director of Testing*, College of Notre Dame, Belmont, California
Maurice R. Young, *School Psychometrist*, San Jose Unified School District, San Jose, California